

STATE OF DELAWARE



ENERGY ASSURANCE PLAN



DEPARTMENT OF NATURAL RESOURCES AND
ENVIRONMENTAL CONTROL
DIVISION OF ENERGY AND CLIMATE
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DOVER, DELAWARE 19904

STATE OF DELAWARE ENERGY ASSURANCE PLAN

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And the

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Executive Summary

The Delaware Energy Assurance Plan (EAP) is a comprehensive manual for state government leaders charged with the responsibility of ensuring the health, welfare, and safety of the citizens of the state during periods of energy emergencies. The plan describes the way the state will respond if an energy shortage of a substantial nature occurs or appears imminent. The Delaware Department of Natural Resources and Environmental Control, State Energy Office (SEO) is the lead agency for energy emergency planning. The Delaware Emergency Management Agency (DEMA) director is the primary advisor to the governor in an emergency/energy crisis. The SEO and DEMA works in close consultation with the Delaware Public Service Commission (PSC) during energy emergency shortages.

The plan uses three basic strategies to minimize disruption of energy supply or the perception of an emergency. These strategies are: voluntary and mandatory demand reduction measures, substitution of alternative resources when possible, and state government programs to curtail excessive use. Further, the plan defines emergency conditions and how to monitor the indicators; identifies key players, as well as their roles and responsibilities; identifies the flow of information among agencies, private industry, and the public; recommends “measures” to reduce demand on resources; and discusses the economic impact of higher priced fuel on low-income persons. The plan is organized around three emergency response phases that contain increasing levels of activity depending on the severity of the energy emergency. These are discussed in Chapter 2.

This plan outlines means the state can use to monitor an energy shortage and decide whether or not an energy emergency should be declared. It describes the actions that must be taken to declare a state of energy emergency. It outlines decision-making and administrative structure that will be used during a time of emergency. It suggests levels of emergency that may occur for shortages of each fuel type with voluntary and/or mandatory measures appropriate for the level of shortage. If a substantial shortage exists, or appears imminent, the SEO and the DEMA director may recommend that an energy emergency be declared for one or more fuel sources. At this time the Director of DEMA may open the Delaware Emergency Operations Center (State EOC), to be staffed jointly by SEO staff, ESF-12 Group, DEMA staff, relevant state agencies, and others. The Governor may call into order various agencies of state government, representatives of local governments, and non-governmental organizations.

The Governor may recommend voluntary reduction in energy use such as lowering thermostats, or in a severe crisis may require that certain buildings be closed for the duration of the emergency and heated or cooled only at building protection levels. The Governor might initially encourage carpooling or later require alternate day fill-ups for motor vehicles. These measures will be voluntary to the extent possible and mandatory in more severe fuel shortages and may be localized or statewide in scope. The goal of actions recommended or required by the Governor will be to distribute available resources in an equitable manner, to maintain essential services to the extent possible, and to protect the health and welfare of Delaware’s citizens. Fuel assistance programs designed to help mitigate energy-related economic hardships to low-income households are discussed in Chapter 10. The plan relies on the free market to operate, with government intervention assumed only under conditions of extreme emergency. During an energy emergency, the state’s responsibility is to communicate, coordinate, aid, and assist. The private sector’s responsibility is to repair damage and get commercial and industrial systems back on track as soon as possible. These actions are achievable through communication, cooperation, and reliance on the voluntary action of communities, suppliers, and Delaware’s citizens. Additional support information, such as public information brochures, press releases, and key contacts are located at the SEO office in Dover, Delaware

Table of Contents

Executive Summary	ii
Preface	xiv
Chapter 1 – Delaware Energy Emergency Response Plan Introduction	1.1
1.1 Introduction	1.1
1.2 Authority of the Plan	1.2
1.3 Purpose of the Plan	1-2
1.4 Principles of the Plan	1.2
1.5 Characteristics of Energy Emergencies	1.4
1.6 Achieving and Maintaining Operational Readiness	1.5
1.7 Plan Development and Maintenance Responsibility	1.6
1.8 Federal Laws Relating to Energy Emergency Preparedness	1.7
Chapter 2 - Energy Emergency Response Phases and Activities	2.1
2.1.1 Delaware Energy Office (DEO)	2-1
2.1.2 Delaware Emergency Management (DEMA)	2-1
2.2 Energy Emergency Response Phases	2-2
2.3 Defining the Four Phases of an Energy Emergency	2-3
2.3.1 Phase I - Monitor and Alert – Response Activity	2-3
2.3.2 Phase II – Assess and Take Action – Response Activity	2-4
2.3.3 Phase III – Actions and Feedback	2-4
2.3.4 Phase IV – Review Lessons Learned	2-5
2.3.5 Energy Emergency –Potential Conditions & Probable Impacts	2-6
2.3.7 Chart – Energy Emergency Shortage	2-7
Chapter 3 - Physical and Cyber Security	3-1
3.1 Background	3-1
3.1.1 Operations Security	3-2
3.1.2 Information System Network Architecture and Penetration Testing	3-2
3.1.3 Consequence Analysis	3-3
3.1.4 Risk Characterization	3-3
3.1.5 Regional, Local, and Roles and Responsibilities	3-4
3.1.6 Regional CIKR Partnerships	3-5
3.1.7 Protecting Sensitive Information	3-8
3.1.8 Energy Assurance Planning for Utilities	3-8

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

3.1.9	Questions to Explore Concerning Critical Infrastructure	3-8
3.2	Cyber Security	3-9
3.2.1	Cyber Security Threats	3-9
3.2.2	Cyber Security Considerations in Energy Assurance Planning	3-11
3.2.3	Federal and State Cyber Security Resources	3-12
3.2.4	Delaware's Role in Cyber Security in the Energy Sector	3-14
3.2.5	Committee and Working Groups	3-14
Chapter 4 – Roles and Responsibilities		4-1
4.1	Organization	4-1
4.2	Responsibilities of State Agencies	4-1
4.2.1	Executive Department (ED)	4-1
4.2.1	Office of the Governor (OG)	4-1
4.2.3.1	Office of Management and Budget (OMB)	4-2
4.2.3.1.2	Fleet Services	4-2
4.2.3	Department of Natural Resources and Environmental Control (DNREC)	4-2
4.2.3.1	State Energy Office (SEO)	4-2
4.2.4.1.1	Contingency Planning Manager	4-3
4.2.2.1.2	Data Coordinator	4-3
4.2.2.1.3	Emergency Support Function ESF-12 Advisory Group	4-3
4.2.2.4	Office of Management and Budget	4-3
4.2.3.1	Division of Support Services	4-3
4.2.3.1.1	Office of Fleet Services	4-3
4.2.3.2	Public Service Commission (PSC)	4-3
4.2.4	Department of State (DS)	4-4
4.2.4.1	Public Service Commission (PSC)	4-4
4.2.5	Department of Safety and Homeland Security (DSHS)	4-5
4.2.4.1	Delaware Emergency Management Agency (DEMA)	4-5
4.2.6	Department of Health and Social Services	4-5
3.2.5.1	Delaware Emergency Management Agency (DEMA)	4-5
4.2.6.1	Division of State Service Centers	4-6
4.2.6.2	Division of Aging	4-6
4.2.6.3	Division of Public Health (DPH)	4-6
4.2.6.4	Division of Social Services	4-6

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

4.2.6.5	Economic Assistance Coordinator-----	4-6
4.2.7	Department of Transportation (DELDOT) -----	4-6
4.2.8	Department of Labor -----	4-7
4.2.8.1	Division of Unemployment Insurance-----	4-7
4.2.9	Department of Agriculture-----	4-7
Chapter 5 – Delaware Petroleum Supply and Usage Data -----		5-8
5.1	Delaware Motor Fuel Use-----	5-9
5.2	Motor Fuel Delivery-----	5-10
5.2.1	Delaware City Refinery-----	5-10
5.3	Motor Fuel Shortage – What Can Go Wrong? -----	5-11
5.4	Monitoring Motor Fuel Shortages-----	5-12
5.5	State Government Actions-----	5-13
5.5.1	Voluntary Measures-----	5-13
5.5.2	Fuel Delivery Regulation Waivers/Suspensions -----	5-14
5.5.1	Mandatory Measures-----	5-15
5.6	Local/County Government Actions-----	5-17
5.7	Delaware’s Emergency Fuel Allocation Program (Set-Aside) -----	5-18
5.8	Public Information Program for Motor Fuel Shortage -----	5-18
5.9	Governor’s Motor-Fuel Advisory Group -----	5-19
5.10	Motor Fuel Emergency Contacts-----	5-20
5.11	Phase I – Monitor and Alert Activities – Motor Fuel Shortage-----	5-22
5.12	Phase II – Access and Determine Action – Motor Fuel Supply Shortage -----	5-23
5.13	Phase III – Actions and Feedback - Motor Fuel Shortage -----	5-24
5.14	Phase IV – Review Lessons Learned – Motor Fuel Shortage -----	5-26
Chapter 6 - Electricity Shortage Emergency -----		6-1
6.1	State of Delaware Electricity Profile-----	6-1
6.1.1	Middle-Atlantic Power Project-----	6-3
6.2	Contingency Issues-----	6-4
6.2.1	What Could Go Wrong? -----	6-4
6.3	Delaware Electric Providers -----	6-5
6.3.1	Electricity and Home Furnaces -----	6-5

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

6.4	Phase I – Monitor and Alert Activities -Electricity Distribution Shortage -----	6-6
6.5	Phase II – Access and Determine Action – Electricity Distribution Shortage -----	6-6
6.6	Phase III – Actions and Feedback – Electricity Supply Shortage -----	6-8
6.7	Phase IV – Review Lessons Learned – Electricity Distribution Shortage -----	6-9
6.8	Phase IV – Delaware Governor Emergency Actions for Consideration-----	6-10
Chapter 7 - Natural Gas Shortage Emergency -----		7-1
7.1	Natural Gas Overview -----	7-1
7.1.1	Chesapeake Utilities Corporation-----	7-1
7.2	Description -----	7-2
7.3	Natural Gas Shortage-----	7-3
7.4	Delaware Natural Gas Supply -----	7-3
7.5	What Can Go Wrong?-----	7-3
7.6	Natural Gas Transmission -----	7-3
7.7	Phase I – Monitor and Alert Activities - Natural Gas Supply Shortage -----	7-5
7.8	Phase II – Assess and Determine Actions - Natural Gas Supply Shortage -----	7-6
7.9	Phase III – Actions and Feedback - Natural Gas Supply Shortage-----	7-7
7.10	Phase IV – Review Lessons Learned - Natural Gas Supply Shortage -----	7-8
Chapter 8 - Propane Shortage Emergency -----		8-1
8.1	Liquefied Petroleum Gas Description (LPG)-----	8-1
8.2	Propane Shortage Emergency -----	8-1
8.3	Propane Usage -----	8-2
8.4	Propane Supply -----	8-2
8.5	Phase I – Monitor and Alert Activities - Propane Supply Shortage -----	8-4
8.6	Phase II – Assess and Determine Action – Propane Supply Shortage -----	8-5
8.7	Phase III – Actions and Feedback – Propane Supply Shortage-----	8-6
8.8	Phase IV – Review Lessons Learned – Propane Shortage -----	8-8
Chapter 9 - Heating Oil-Kerosene Shortage Emergency -----		9-1
9.1	Heating Oil Description -----	9-1
9.2	Kerosene -----	9-1
9.2.1	Kerosene Supply -----	9-2
9.2.2	Space heating -----	9-2
9.3	Heating Fuel Oil No. 2 -----	9-2
9.3.1	Blending Component -----	9-2

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

9.4	Phase I – Monitor and Alert Activities - Heating Oil Supply Shortage -----	9-4
9.5	Phase II – Assess and Determine Action - Heating Oil Supply Shortage-----	9-5
9.6	Phase III – Actions and Feedback - Heating Oil Supply Shortage-----	9-7
9.7	Phase IV – Review Actions Learned - Heating Oil Supply Shortage-----	9-9
9.8	Delaware Heating Oil Dealers-----	9-10
Chapter 10 – Coal Shortage Emergency-----		10-1
10.1	Background -----	10-1
10.2	Delaware Coal Fired-Plants Legislative Issues -----	10-1
10.3	Railroads Delivering Coal to Power Plants in Delaware-----	10-2
10.4	Delaware’s Four Coal-Fired Power Plants -----	10-3
10.5	What Can Go Wrong?-----	10-4
10.6	Phase I – Monitor and Alert Activities - Coal Supply Shortage-----	10-6
10.7	Phase II – Assess and Determine Action - Coal Supply Shortage-----	10-6
10.8	Phase III – Actions and Feedback - Coal Supply Shortage-----	10-8
10.9	Phase IV – Review Actions Learned - Coal Supply Shortage-----	10-9
10.10	Governor’s Emergency Actions for Consideration -----	10-10
Chapter 11 - Aviation Fuel Shortage Emergency -----		11-1
11.1	Delaware’s Airport Background -----	11-1
11.2	New Castle Airport -----	11-1
11.3	Dover Air Force Base -----	11-1
11.3.1	Dover AFB Civil Air Terminal-----	11-1
11.4	Sussex County Airport-----	11-2
11.5	Delaware Airpark -----	11-2
11.6	Aviation Fuel System Description -----	11-2
11.7	Airports in Delaware-----	11-2
11.8	Phase I – Monitor and Alert Activities - Aviation Fuel Supply Shortage-----	11-2
11.9	Phase II – Assess and Determine Action - Aviation Fuel Supply Shortage-----	11-2
11.10	Phase III – Actions and Feedback - Aviation Fuel Supply Shortage -----	11-3
11.11	Phase IV - Review Actions Learned - Aviation Fuel Supply Shortage-----	11-4
Chapter 12 – Pipeline – Distribution Emergency -----		12-1
12.1	What makes up the Pipeline Network? -----	12-1
12.2	Pipelines – What Can Go Wrong? -----	12-3
12.3	Types of Pipelines -----	12-4

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

12.4	Threats to Pipelines-----	12-5
12.5	Government Coordinating Council (GCC) -----	12-5
12.6	Federal Agencies Responsible for Pipelines-----	12-5
12.8	FERC Pipeline Engineering Data and Damage -----	12-6
12.9	Phase I – Monitor and Alert Activities – Pipeline Distribution Problem-----	12-7
12.10	Phase II – Assess and Determine Action - Pipeline Distribution Problem -----	12-7
12.11	Phase III – Actions and Feedback - Pipeline Distribution Problem-----	12-8
12.12	Phase IV - Review Actions Learned - Pipeline Distribution Problem -----	12-9
Chapter 13	- Communication and Public Information -----	13-1
13.1	Communication and Public Information-----	13-1
13.2	Objective and Purpose of Public Information Program-----	13-1
13.3	Information Gathering -----	13-2
13.4	Energy Industry Monitoring -----	13-2
13.5	Monitoring the Economic Impacts -----	13-3
13.6	Estimated Savings -----	13-3
13.7	Communication of Voluntary Demand Reduction Programs -----	13-3
13.8	Communication of Mandatory Demand and REDUCTION Programs-----	13-4
13.9	A Media Center -----	13-4
13.10	Emergency Alert System -----	13-4
13.11	Energy Conservation Press Release #1 -----	13-7
13.12	Press Release #2 -----	13-8
13.13	Public Information System Matrix -----	13-9
Chapter 14	- Economic Assistance Programs -----	14-1
14.1	Economic Assistance Programs -----	14-1
14.2	Multi-Agency Task Force -----	14-1
14.2.1	Economic Assistance Coordinator -----	14-1
14.3	Existing Economic Assistance Programs -----	14-2
14.3.1	Low-Income Energy Assistance Program -----	14-2
14.3.1.1	Financial Assistance -----	14-2
14.3.1.2	Weatherization Program -----	14-2
Chapter 15	– Energy Shortage Emergency Mitigation Measures and Projects-----	15-1
Project 1	15-1	
Project 2	-----	15-2

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Appendix A – Emergency Contacts & Glossary	A-1-A-30
Appendix B – Delaware State Set-Aside Program Emergency Fuel Allocation	B-1
1. Introduction	B-1
1.1 Purpose	B-1
1.2 Description	B-1
1.2.1 Basic Hardship Element	B-1
1.2.2 Community Hardship Element	B-1
1.2.3 Assignment and Adjustment Element	B-1
1.2.4 Certification Element	B-2
1.3 Set-Aside Priority System	B-2
1.3.1 Minimum Fuel Purchase	B-3
1.3.2 Maximum Fuel Purchase	B-2
1.3.3 Set-Aside Volume	B-2
1.3.4 Unused Set-Aside Volume	B-3
1.4 Operating Guidelines	B-3
1.4.1 Set-Aside Contingency File	B-3
1.4.1.1 Contingency File Contents	B-4
1.5 Appeal Process	B-4
1.6 Audit Program	B-5
1.7 Reports	B-6
1.8 Set-Aside Program Staff Descriptions	B-6
1.8.1 Economic Assistance Coordinator	B-6
1.8.2 Fuel Contingency Manager Non-Essential Management Tasks	B-7
1.8.3 Fuel Contingency Manager Emergency Management Tasks	B-7
1.8.4 Fuel Industry Liaison by SEO	B-9
1.8.4.1 Fuel Industry Liaison Reports	B-9
1.9 Set-Aside Program Implementation	B-10
1.9.1 Key Positions General Descriptions	B-10
1.9.2 Operating Guidelines	B-10
1.9.2.1 Fuel Industry Liaison Reports	B-11
1.10 Set-Aside Program Implementation	B-11
1.10.1 Operating Guidelines	B-11
State Set-Aside “Sample Executive Order”	B-13 to B-23

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Appendix C Fuel Reduction Measures	C-1
1.0 Odd/Even Fuel Distribution Measure	C-1
1.1 Description	C-1
1.2 Purpose and Objectives	C-1
1.3 Implementation Procedures	C-1
1.4 Exemptions	C-2
1.5 Requirements for Retail Gasoline Dealers	C-2
1.6 Advantages and Disadvantages	C-3
1.7 Estimated Savings	C-4
1.8 Private Sector Savings	C-4
1.9 State Energy Office (SEO) Response Team Implementation	C-5
1.10 Enforcement and Compliance	C-5
1.11 Technical Assistance Provided by SEO	C-5
2.0 Implementation	C-6
2.1 Description, Purpose, and Objectives	C-6
2.2 Implementation Procedures	C-6
2.3 Stages of Implementation	C-6
2.4 Advantages and Disadvantages	C-7
2.5 Estimated Energy Savings	C-7
2.6 Private Sector Costs	C-7
2.7 SEO Implementation	C-8
3.0 Maximum Fuel Purchase Measure	C-8
3.1 Description	C-8
3.2 Procedure	C-8
3.3 Exemptions	C-9
3.4 Stage of Implementation	C-9
3.5 Estimated Energy Savings	C-9
3.6 Private Sector Costs	C-10
4.0 Extended Purchase Plan	C-11
4.1 Description	C-11
4.1.1 Purpose and Objectives	C-11
4.2 Implementation Procedures	C-11
4.3 Requirements for Retail Motor Fuel Stations	C-12

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

5.0	Speed Limit Enforcement -----	C-12
5.1	Purpose and Objective -----	C-12
5.2	Implementation Procedures -----	C-13
5.3	Exemptions -----	C-13
5.3.1	Estimated Energy Savings -----	C-14
5.4	Private Sector Costs -----	C-14
5.4.1	Impacts on Importing of Oil -----	C-14
5.4.2	Impacts of the Measure on the State and Local Economy -----	C-14
5.4.3	Social Impacts -----	C-15
6.0	Parking and Alternative Transportation Management Measures -----	C-15
6.1	Purpose and Objectives -----	C-15
6.2	Implementation Procedures -----	C-15
6.3	Exemptions -----	C-15
6.4	Stages of Implementation -----	C-15
6.5	Advantages and Disadvantages -----	C-15
7.0	Employee-Based Travel Measures -----	C-15
7.1	Description -----	C-15
7.1.1	Purpose and Objectives -----	C-16
7.1.2	Implementation Procedures -----	C-17
7.2	Exemptions -----	C-18
7.3	Stages of Implementation -----	C-19
7.4	Advantages and Disadvantages -----	C-19
7.5	Implementation -----	C-20
7.6	Acceptability -----	C-21
7.7	Estimated Energy Savings -----	C-21
8.0	Private Sector Costs -----	C-21
8.1	Local Government Responsibilities -----	C-22
8.1.1	Implementation -----	C-22
8.1.2	Data Collection and Analysis Required for Evaluation -----	C-23
9.0	School System Conservation Measure -----	C-24
9.1	Description -----	C-24
9.1.1	Purpose and Objectives -----	C-24
9.1.2	General Procedures -----	C-24

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

9.1.3	Stages of Implementation-----	C-25
9.1.4	Advantages and Disadvantages-----	C-25
9.1.5	Estimated Energy Savings -----	C-26
9.1.6	Private Sector Costs -----	C-26
Appendix D - Delaware Emergency Fuel Response Plan -----		D-1
1.0	Introduction – Delaware Fuel Management Plan -----	D-2
2.0	Legal Authority and References -----	D-1
3.0	Management System-----	D-2
4.0	Communication Procedures -----	D-3
5.0	Conservation Strategies -----	D-4
6.0	Voluntary Contingency Measures for Industry -----	D-5
7.0	Emergency Classification Levels -----	D-7
8.0	Operational Procedures -----	D-11
Appendix E - Additional Information Pertaining to Federal Agency Assistance -----		E-1
1.0	The U.S. Department of Energy-----	E-1
1.1	Office of Policy -----	E-1
1.2	Office of Energy Assurance (OEA)-----	E-1
1.3	Energy Information Administration (EIA)-----	E-1
1.4	Additional Activities -----	E-2
2.0	Federal Emergency Management Agency and the Federal Response Plan -----	E-2
2.1	FEMA Role and Responsibility-----	E-2
2.2	Federal Response Plan -----	E-3
2.3	Organization of the FRP-----	E-3
3.0	State Assistance -----	E-3
4.0	Additional Assistance-----	E-3
5.0	Energy Consequences -----	E-4
Appendix F Monitoring Fuel Supplies -----		F-1
1.	Monitoring Electricity -----	F-1
1.1	General Information-----	F-1
1.2	Reporting to DOE-----	F-1
1.3	Data Sources-----	F-1
1.3.1	Electricity Sales -----	F-1
1.3.1.1	Electricity Production by Fuel Source -----	F-1

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

1.3.2	Monitoring Natural Gas-----	F-3
1.3.2.2	Data Sources-----	F-3
1.3.2.2.1	Interstate Deliveries to LDC-----	F-3
1.3.2.2.2	Protected System Send-Outs-----	F-3
1.3.2.2.3	Spot and Contract Prices-----	F-3
1.3.2.2.4	Curtailment Notices-----	F-4
1.3.2.2.5	Heating Degree Days-----	F-4
1.3.2.2.6	Contact Names, Addresses and Telephone Numbers-----	F-4
2.0	Monitoring Petroleum-----	F-4
2.1	Monitoring Petroleum Markets-----	F-4
2.1.1	Liaison-----	F-4
2.1.2	Petroleum Infrastructure-----	F-5
2.1.3	Decentralized Delivery Network-----	F-5
2.1.4	Estimating the Severity of a Shortage-----	F-5
2.1.5	Supply and Demand-----	F-5
2.1.5.1	Motor Fuel Consumption (Gasoline)-----	F-5
2.1.5.1.1	Petroleum Product Demand-----	F-6
2.1.5.1.2	Form EIA-782C Wholesale and Retail Price Wholesales-----	F-6
2.1.5.1.4	Inventories and Production-----	F-6
2.1.5.1.5	Infrastructure Information-----	F-6
2.1.5.1.6	Source of Crude Oil-----	F-7
2.1.5.1.7	Heating Degree Days-----	F-7
2.1.5.1.8	Contact Names, Addresses, and Telephone Numbers-----	F-7
Appendix G - Energy Responders Information-----		G-1
1.0	Delaware's State Energy Profile-----	G-1
1.1	The Basics of the State's Natural Gas Industry-----	G-1
1.1.1	Investor Owned Utilities-----	G-1
1.2.2	Electric Membership Cooperatives (EMC)-----	G-1
1.2.3	Municipal Electric Utilities-----	G-1
1.1.4	Generation Plants-----	G-2
1.1.5	Interstate Sales-----	G-2
1.5.6	Desired Data-----	G-2
1.5.7	Transmission-----	G-2

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

1.5.8	The Basics of Delaware’s Natural Gas Industry -----	G-3
1.5.8.1	Structure and Ownership in the Gas Industry-----	G-3
1.5.8.2	Local Distribution Companies -----	G-3
1.5.8.3	Natural Gas Infrastructure -----	G-4
1.2	Basic’s of the State’s Petroleum Industry -----	G-4
1.2.1	Ownership Structure -----	G-4
1.2.2	Retailers -----	G-5
1.3	Vulnerability Assessment-----	G-6
1.4	Demographics-----	G-6
1.5	Energy Emergency Stakeholders -----	G-6
1.6	Assessment -----	G-7
Appendix H - NASEO’s Quick Guidelines: Ten Things You Should Know -----		H-1

Preface

The State of Delaware, its political subdivisions, and its citizens are highly dependent upon energy resources. A serious energy shortage could bring substantial injury to commercial and industrial activity and to the personal health, safety, and welfare of Delaware's citizens.

The Delaware Department of Natural Resources Environmental Control, State Energy Office (SEO) is designated as the coordinating agency for energy emergency planning, response, and mitigation. This plan reflects the state's priorities for a response to an energy shortage. In order to implement this plan, a number of state agencies, entities, and others will work together to successfully mitigate energy shortages through conservation and other means. The goals and objectives outlined in the plan and within the appendices support this effort. Accomplishments can be realized only by joint efforts, dedication, and commitment to energy shortage mitigation. Clear recognition is made that energy producers and suppliers have emergency response plans of their own, which will be used in emergency situations.

The Delaware State Energy Office encourages companies, institutions, and communities to develop and exercise plans for energy emergencies.

This plan was prepared in accordance with U.S. Public Law 94-163, Section 362 (1975), Energy Policy and Conservation Act of 1975, and is described as Emergency Support Function (ESF-12) of the Delaware Emergency Operations Plan (State DEOP) managed by the Delaware Emergency Management Agency (DEMA).

1.1 CHAPTER 1 - INTRODUCTION

The Delaware Energy Assurance Plan (EAP)¹ for the State of Delaware (referred hereafter as the

that may be enacted by the state if an energy emergency occurs.

An "**energy emergency**" is an actual or impending shortage or curtailment of usable, necessary energy resources, such that the maintenance of necessary services; the protection of public health, safety, and welfare; or the maintenance of a basically sound economy is imperiled in any geographical section of the state.

The plan relies on a mixed strategy to respond to varying degrees of an energy shortage or

on the market to the fullest extent possible to respond to early stages of an energy shortage or emergency. The State of Delaware intervention occurs only to the extent necessary to protect public health, safety and welfare. The Department of Natural Resources and Environmental Control (DNREC)², Delaware Energy Office³ (referred hereafter as the DEO is responsible for implementation of the EAP. The DEO in coordination with the Delaware Public Service Commission (PSC⁴), and the Delaware Emergency Management Agency (DEMA) will direct the energy emergency contingency operations in the state, at the direct order from the governor. This group (DEO, PSC, DEMA) work together as the Energy Response Team). The DEO and the PSC coordinates all activities in the event of energy emergency with DEMA within the Delaware Department of Safety and Homeland Security (DSHS)⁵.

The plan corresponds to the federal government's energy emergency policy. The federal government's energy emergency policy is essentially to ensure that the United States has an adequate supply of energy at a reasonable cost. In support of this policy, the Energy Emergency Preparedness Program of the U.S. Department of Energy (DOE)⁶ is directed toward reducing our vulnerability to energy supply disruptions and enhancing our ability to respond should a disruption occur.

Delaware Quick Energy Facts

Population: 830,364 (2004) ranked 45th
Per Capita Income: \$35,861 (2004) ranked 10th
Total Energy Consumption: 0.3 quadrillion Btu (2001), ranked 46th
Per Capita Energy Consumption: 368 million Btu (2001), ranked 21st
Total Petroleum Consumption: 3.0 million gallons per day (2001), ranked 47th
Gasoline Consumption: 1.1 million gallons per day (2001), ranked 46th
Distillate Fuel Consumption: 0.4 million gallons per day (2001), ranked 50th
Liquefied Petroleum Gas Consumption: 0.2 million gallons per day (2001), ranked 45th
Jet Fuel Consumption: 0.01 million gallons per day (2001), ranked 49th

Figure 1.1—SOURCE: DOE

At the Federal Government Level – Emergency Support Function (ESF-12) – Energy helps restore the Nation's energy systems following a major disaster, emergency, or other significant event requiring federal response assistance. In addition, the Department of Energy (DOE) members of ESF-12 provide direct coordination with all other departmental response elements.

Figure 1.2—SOURCE: DOE

¹ State of Delaware Energy Assurance Plan (EAP)

² State of Delaware Department of Natural Resources and Environmental Control (DNREC)

³ Delaware Energy Office (DEO)

⁴ Delaware Public Service Commission (PSC)

⁵ Delaware Department of Safety and Homeland Security (DHSS)

⁶ U.S. Department of Energy (DOE)

1.2 AUTHORITY OF THE PLAN

Federal authority for preparing the Delaware Energy Emergency Response Plan is based on the **U. S. Public Law 94-163, Section 362, of 1975**. This Law provides for the development of standby state energy conservation plans to reduce energy demand by regulating the public and private consumption of energy during a severe energy supply interruption.

DOE's responsibilities involve operations in both the domestic and international spheres.

The state's authority for preparing the plan is sections Title 20, Delaware Code, Chapter 31, 3101, 3102, 3107, and 3115⁷ that govern the state energy emergency response activities.

1.3 PURPOSE OF THE PLAN

The purpose of the plan is to provide for timely and coordinated notification to state government, private sector entities, institutions, the media and residents in the state the occurrence of energy emergency, and define appropriate actions to be taken, including enactment of regulations, rules, laws and other actions by the state.

Energy shortage management mitigates the occurrence of crises resulting from the shortage of any vital resource as a consequence of interruption or shortage of electricity, petroleum products, natural gas, propane gas, or any of the resources used in the generation of electricity; and when it is not possible to avert a crisis, to take such actions as are necessary to ensure the health, safety, and welfare of the citizens of the state. Vital resources are defined to include food for domestic use, water for domestic, agricultural, or industrial use, and electricity, petroleum based fuels, uranium, coal, natural gas, propane gas, or any other form of energy.

The plan has defined three phases of energy emergency. The point of transition from one phase to the next phase is not absolute. To a large degree, it is qualitative; the implementation of

⁷ Title 20, Delaware Code, Chapter 31, 3101, 3102, 3107, and 3115



Factors Defining Energy Emergencies

- Cause and depth of energy shortage, and fuels affected
- Distribution of the shortfall among customers
- Perception of the public
- Time of year (weather factors)
- Nature of the energy use system
- Nature and capabilities of the energy distribution system (especially infrastructure)
- Likely duration of the shortage

Figure 1.4

each phase will be a DEO and DEMA Director's policy decision. The three phases are: Verification, Pre-Emergency, and Emergency.

This plan provides a systematic framework for actions that can be taken should an energy shortfall occur. The plan covers petroleum products, heating fuels, natural gas, propane gas, coal, and electricity.

1.4 PRINCIPLES OF THE PLAN

In the event demand for energy products/services exceeds the available supply in the state, or if disruption in supply of energy products or electricity distribution occurs, the state is the basic authority and the protector of the citizen's health, safety and welfare may activate the plan. In cooperation with the other public institutions and the private sector, the state's primary goals in managing an energy emergency shall be:

- Ensure essential public services are provided during an energy shortage.
- Work with industries to reduce inequities in the distribution of fuel, including petroleum-derived fuels, such as diesel and gasoline.
- Assist in alleviating economic hardships caused by an energy shortage;
- Solicit and obtain business and public support and participation in the implementation of the plan,
- Ensure timely gathering and dissemination of accurate information during an energy shortage to guide state actions in responding to an emergency.

The DEO and PSC in coordination with DEMA will direct all activities in response to an energy emergency at all levels of the state government, ensuring a coordinated response to the energy emergency.

1. The effectiveness of the plan relies on three factors to achieve and maintain operational readiness. State, regional, national and world events that may affect energy supply must be continuously monitored through the U.S. Department of Energy Information Agency (EIA)⁸ and news sources.

⁸ U.S. Department of Energy Information Agency (EIA)

Energy Emergency Response

Primary Agency: DEO

Support Agency: DEMA

PURPOSE

To provide a coordinated response in the restoration of energy services in a disaster area in order to save lives and protect health, safety, and property, and to carry out other emergency response functions.

SCOPE

- Assess energy system damage, energy supply, demand, and requirements to restore such systems
- Assist local governments to obtain emergency fuel for transportation, communications, and emergency operations
- Provide assistance to energy suppliers in obtaining equipment, specialized personnel, and transportation to repair or restore energy systems.
- Administer emergency energy information, education, and conservation to the public

EMERGENCY RESPONSE ACTIONS

- Activate the State EOC.
- Determine from damage assessment, energy status of affected areas.
- Using the information available, determine the possible energy needs for response.
- Receive and assess requests for energy assistance from local jurisdictions and other state agencies.
- Provide accurate assessments of energy supplies, demands, and requirements for repair and restorations of energy systems to DEMA EOC staff.
- Assist in assessing priorities for energy restoration.

- The energy emergency response activities are described in Chapters 4 through 11 the plan and must be adaptable to changing conditions.
- The DEO, DEMA, and other state agencies must be trained to implement the plan.
- The plan relies on a cooperative partnership between government agencies and private industry. The DEO, in coordination with DEMA, will implement a network of contacts with industry and all levels of government, ensuring a coordinated state response to an energy shortage or disruption. Since the purpose of the plan is primarily one of operational response to an energy emergency, the plan does not include strategies for long-range vulnerability reduction, such as fuel efficiency, alternate fuels, land-use planning and fuel storage.

1.5 CHARACTERISTICS OF ENERGY EMERGENCIES

In general, an energy emergency exists whenever supplies of fuels or electricity are inadequate to meet demand. However, it is useful to delineate the following situations of an energy problem. These are:

- Physical destruction of energy systems and/or components by natural factors such as hurricanes, earthquakes, or floods.
- Industrial accidents or sabotage of energy supplies and/or distribution facilities.
- Acts of man such as industrial accidents, terrorist acts, or sabotage of energy supply and/or distribution facilities.
- A sudden or unexpected surge in demand that cannot be met by actual or expected supply levels.

A sharp, sudden escalation in the price of energy products, resulting from a curtailment of supplies and stocks. Situations at the local level that may affect energy emergencies are:

- A national security emergency and a mobilization of defense resources, creating a sudden surge in demand.

Potential Causes of a State of Delaware Energy Emergency Event	
Severe Low Temperatures, High Winds	
Propane: Increased demand for heating	
Natural Gas: Increased demand for heating	
Coal and Electric: Increased demand for electricity power for heating	
Oil Embargo	
Petroleum Products: Reduced supply including propane produced by refineries	
Natural Gas: Increased demand as alternative fuel	
Coal and Electricity: Increased demand as alternative energy supplies	
Natural Disaster, Any Major Accident	
Reduced supply; disrupted distribution; increased demand for alternative fuels; reduced demand for fuels if industries are closed as a result of the disaster	
Major Coal Work Stoppage	
Natural Gas: Increased demand as alternative propane and petroleum products	
Coal and Electricity: Possible reduced supply	
Any Other Work Stoppage	
Reduced supply; disrupted distribution; increased demand for alternative fuels; reduced demand	
National Security Emergency/Mobilization/War/Terrorism/Sabotage	
Increased demand for fuels. Possible reductions in fuel supplies available to the United States or other countries increased purchases or geopolitical factors reduce sales to the United States or its allies	
Distribution of fuels to the State of Delaware may be disrupted by severe low temperatures and high winds in other regions of the United States, as well.	
Figure 1.6	

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- A widespread public perception of an imminent energy event related to any of the above listed, causing a surge in the purchase of products.
- Delaware's economy is affected by the energy emergency.
- Residents are unable to receive energy products due to reduced supply from the supplier to the retailers.
- Political factors — All potential causes of an energy emergency can be classified within these situations. However, events may contribute to an energy emergency in more than one of the above ways mentioned. For example, an oil embargo may reduce supplies of several fuels and, simultaneously increase the demand for alternate fuels.

Potential causes of an energy emergency include severe, long-lasting temperature extremes or major fuel supply disruptions. Other events that contribute to an energy emergency are natural or human disasters that disrupt energy production or distribution such as fires, tornadoes, floods, storms, or breakdowns. Figure 1.6 lists the fuels that would be affected by several types of major energy emergencies and the effects on demand, supply, and/or distribution.



Strategic Petroleum Field in Louisiana

1.6 ACHIEVING AND MAINTAINING OPERATIONAL READINESS

The success and effectiveness of this plan relies on the three factors to achieve and maintain operational readiness (also mentioned in section 1.4). First, DEO staff must continuously monitor world events that have the potential to affect the global energy system. Second, strategies must be adaptable to changing conditions. Third, personnel must be trained and prepared to implement the plan. The State Emergency Operations Center (SEOC)⁹, Delaware Public Service Commission (PSC)¹⁰, and DEMA are responsible for carrying out the following steps to achieve and maintain operational readiness of the EAP:

- Monitor international and domestic events for probable impact on Delaware energy prices and supplies.
- Review and update the plan periodically to ensure that the response strategies reflect the changing trends and conditions in the world energy industry.
- Conduct training of DEO, PSC, and DEMA staff, as well as representatives from other state government agencies, local governments, the press, and energy suppliers, to identify the roles and responsibilities of each in responding to an energy shortage.
- Update and maintain lines of communication with government and industry contacts.

⁹ Delaware State Emergency Operations Center (DEOC)

¹⁰ Delaware Public Service Commission (PSC)

- Prepare detailed guidelines and appropriate forms necessary for implementation of the plan's energy emergency response programs.

1.7 PLAN DEVELOPMENT AND MAINTENANCE RESPONSIBILITY

This plan is the principle source of documentation for the State of Delaware's energy emergency response activities. As such, it must be maintained and updated on a regular basis to reflect the changing nature of the energy picture. Overall coordination will be carried out by the DEO. The Plan will be circulated to public and private sector stakeholders for review on no less than a two-year cycle. Agencies and other participants in either the energy emergency planning process or participants in the EAP implementation must submit all recommended plan changes to the DEO.

In addition to the biannual review, the DEO will assess after action reports from past incidents and exercises to identify lessons learned and areas for further improvement of the Plan.

The DEO will consolidate and issue appropriate updates to the plan.

Federal Laws Relating to Energy Emergency Preparedness		
Year	Act	Major Provisions
1950	Defense Production Act	The President is given broad authority to require performance on a priority basis of contracts including contracts for energy supplies necessary or appropriate to promote the national defense and to allocate materials (including petroleum) and facilities as necessary to promote the national defense. The Act authorizes the President to require the allocation of, or the priority performance of, contracts relating to supplies, materials, and equipment to maximize domestic energy supplies. The Act provides an antitrust defense for industry participating in voluntary agreements to help provide for the defense of the U.S. The Act authorizes the President to train and employ industry personnel to help plan for and respond to emergencies.
1958	International Emergency Economic Powers Act (IEEPA)	In national emergencies, the President has control over U.S. jurisdiction Property including control of petroleum products in which foreign countries have an interest.
1962	Trade Expansion Act	The President may restrict imports of crude oil and petroleum products if such imports would impair national security.
1975	Energy Policy & Conservation Act (EPCA)	The President is given broad authority to implement U.S. obligations under the Agreement on an International Energy Program to place limits on exports of energy supplies, and to accelerate production rates from wells on Federal lands and, subject to certain conditions, state lands.
1979	Export Administration Act (EAA)	Export controls may be imposed on petroleum products and materials to further foreign policy interests or to protect the economy from a drain of scarce resources.
1975	Energy Emergency Preparedness Act	Provides specific direction regarding the fill rate for the SPR and requires the President to develop allocation plans for emergencies and to submit periodic reports on the nation's level of preparedness.
1975	Executive Order 12656	This Order assigns energy emergency preparedness responsibilities within the Federal government. It assigns to DOE major responsibilities for policy making and a coordinating role within the Federal government for energy emergency preparedness planning and strategy. Within DOE, the Office of Energy Emergencies is the unit which carries out this responsibility.
1990	State Energy Efficiency Programs Improvement Act	The Act amends the Energy Policy and Conservation Act of 1975 stating that effective October 1, 1991, any state receiving Federal financial assistance shall submit an energy emergency planning program to the Secretary of Energy in addition to an energy conservation plan. It shall include implementation of strategies (including regional coordination). Federal financial assistance may be used to develop and conduct the energy emergency planning program. It further authorizes a Pilot Program for the regional reserve of refined petroleum products during 1992 through 1994 and increases the SPR to one billion barrels.
1961 To 1978	Power Plant and Industrial Fuel Act, Natural Gas Policy Act of 1978, Interstate Commerce Act, Disaster Relief Act of 1961, Trading with the Enemy Act, Public Regulatory Policies of 1978, Clean Air Act, Atomic Energy Act, Outer Continental Shelf Act, Magnuson Act, Ports and Waterways Safety Act.	These laws provide additional authority to affect the use or distribution of energy or to take other measures to respond to an energy emergency, including powers related to fuel switching, distribution of energy products, and transportation of petroleum products.
Figure 1.8 -Sources: Compiled from U.S. Department of Justice, Office of Legal Council and U.S. Department of Energy, Office of Emergencies data.		

CHAPTER 2 – ENERGY RESPONSE PHASES AND ACTIVITIES

2.1.1 DELAWARE ENERGY OFFICE (DEO)

The Delaware Energy Office (DEO)¹ is responsible for energy emergency response actions within the state. Dependent upon the location of the energy emergency or disaster, they are responsible for the direction and control of the incident, and may issue directives to other services and organizations concerning disaster preparedness. The political sub-division affected by the energy emergency is responsible for the initial declaration of an emergency or disaster after consultation with DEMA.



2.1.2 DELAWARE PUBLIC SERVICE COMMISSION (PSC)

The Delaware Public Service Commission (PSC) was created in 1949 to regulate investor-owned public utilities works to ensure safe, reliable and reasonably priced cable, electric, natural gas, wastewater, water and telecommunications services for Delaware consumers. For those services that are moving toward competitive markets, the Commission makes rules to level the playing field between competing providers, and resolves disputes between these providers. The PSC also assists consumers in resolving disputes with their service providers. The PSC will participate in the Delaware Energy Response Team.



2.1.3 DELAWARE EMERGENCY MANAGEMENT (DEMA)

DEMA coordinates the day-to-day activities of Delaware's emergency management programs. The emergency management mission for the agency is to ensure the coordination of all resources to effectively respond to and recover from a natural or manmade disaster. This ensures that the maximum number of people and the greatest amount of property in jeopardy from a disaster can be saved and order restored as soon as possible.



The declaration of a local emergency or disaster activates the Delaware Emergency Operations Plan (DEOP)² and authorizes the provision of aid and assistance. It should be activated when an energy emergency or a coordinated response among several local agencies/organizations must be directed. It may be activated when it becomes



¹ DEO – Delaware Energy Office

² DEOP – Delaware Emergency Operations Plan

WHAT IS RESILIENCE? - The [Merriam-Webster Online Dictionary](#) defines “resilience” as: an ability to recover from or adjust easily to misfortune or change. In the context of Energy Assurance Planning resilience can be achieved through various strategies. These can be divided into two groups of actions. The first is emergency response. How can one create effective responses that minimize consequences and provide a rapid recovery and a return to normal conditions? Energy assurance encompasses preparedness activities that enhance the ability to more quickly return to normal following an energy disruption. These efforts are focused on responses after a disruptive event. The second group are actions taken before a disruption that prevent them from occurring (reduce threats) and defend against those disruptions (reduce vulnerabilities). Disruptions are those that result from all hazards whether they are deliberate attacks, technological failures or natural disasters. The first group is addressed through energy emergency preparedness (planning, training and exercises) and the integration of those efforts with other disaster response plans at the local, state and federal levels. The second group is pursued through the efforts undertaken in the mid to long-term as part of the [National Infrastructure Protection Plan \(NIPP\)](#) and the Energy Sector Specific Plan (SSP) and other interdependent SSPs. The NIPP uses the word resilience 27 times in describing the objectives and various initiatives contained in the plan. Resilience can have four infrastructural qualities:

- **Robustness** - *the inherent strength or resistance in a system to withstand external demands without degradation or loss of functionality*
- **Redundancy** - *system properties that allow for alternate options, choices, and substitutions under stress*
- **Resourcefulness** - *the capacity to mobilize needed resources and services in emergencies*
- **Rapidity** - *the speed with which disruption can be overcome and safety, services, and financial stability restored*

For more information see:

Homeland Security Advisory Council, [Report of the Critical Infrastructure Task Force January 2006](#), [Critical Infrastructure, Interdependencies, and Resilience](#), T.D. O'Rourke. The Bridge, Volume 37, No. 1 spring 2007. National Academy

[Source: State Energy Assurance Guidelines, version 3.1 December 2009](#)

Figure 2.2

necessary to commit substantial assets or resources to protect the health and safety of persons or property. Once the energy plan has been activated, DEMA may activate the emergency operations center.

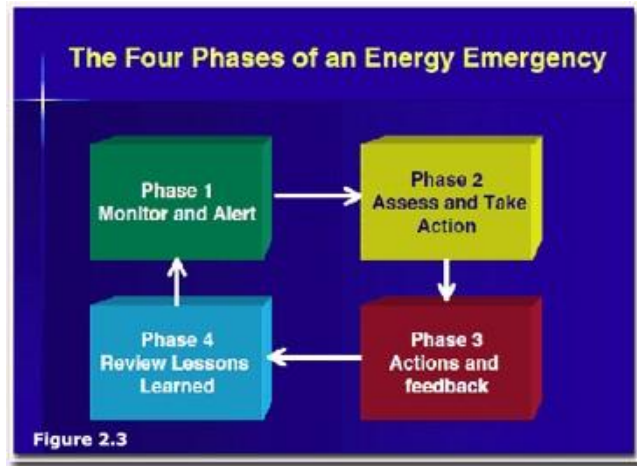
The Governor may declare that an energy emergency exists and is of sufficient severity and magnitude, to require significant fiscal assets. Resources of utility companies and and/or resources to be committed to the incident, and a coordinated response in order to prevent or alleviate damage, loss, hardship or suffering is required.

2.2 ENERGY EMERGENCY RESPONSE LEVELS

There are a variety of measures that the energy industry and government can take to mitigate an energy emergency. It is important that the Delaware Energy Office (DEO) and the Delaware Emergency Management Agency (DEMA) understand how these measures can be undertaken by government, industry, and Delaware's citizens. The process for evaluating the severity of an energy shortage is essential, serving as a basis for determining the extent and duration of the problem to

the state. To respond best to this process, the Emergency Support Function (ESF-12)³ is structured into three phases of increasing activity: Verification, Pre-Emergency, and Emergency see Figure 2.1. During an energy shortage, the activities prescribed in each phase intensify depending on the severity of the shortage.

The point of transition from one phase to the next phase is not absolute. To a large degree, it is qualitative; the implementation of each phase is based on the DEO and DEMA staff and the ESF-12 team's analyses of the characteristics of each energy emergency, the probable impacts, and the required response activities. If it is determined that the event or events are likely to lead to a shortage, DEMA may activate the Monitor and Alert Phase I.



2.2 ENERGY EMERGENCY RESPONSE PHASES

A formal process for evaluating the severity of an energy shortage is essential, serving as a basis for determining the extent and duration of the problem to the state. To respond best to this process, the Emergency Support Function (ESF-12) is structured into four phases of increasing activity: Phase I - Monitor and Alert, Phase II - *Assess and Determine Action*, Phase 3 - Actions and Feedback, and Phase 4 Review Lessons Learned (see Figure 2.3). During an energy shortage, the activities prescribed in each phase intensify depending on the severity of the shortage.

2.3 DEFINING THE FOUR RESPONSE PHASES OF AN ENERGY EMERGENCY

The response of state government, including the Delaware Energy Response Team, DEMA, PSC, and other responders, can be described in four phases. Each phase describes an appropriate level of mobilization required to address a potential or developing emergency situation (see Figure 2.3).

2.3.1 PHASE I MONITOR AND ALERT - RESPONSE ACTIVITY

Upon entering this phase, the DEO, PSC and DEMA begin frequent communications with the U.S. Department of Energy (DOE)⁴, Delaware Petroleum Association (DPA)⁵, private industry, regulated and unregulated utilities and appropriate state and local government agencies. This information is provided to DEMA.

The DEO also initiates the necessary activities for comprehensive and continuous energy supply and demand monitoring. This assessment serves as the basis of a formal Verification Report for

³ ESF-12 – Emergency Support Function (ESF-12)

⁴ U.S. Department of Energy (DOE)

⁵ Delaware Petroleum Association (DPA)

submission to DEMA. manage an actual, verified energy emergency. Several statistical indicators are used for petroleum products, electricity, and propane supply-demand factors to determine the extent of the potential or existing energy emergency.

Phase I - involves the normal ongoing energy supply, demand and price monitoring. State agencies regularly monitor data and information as it becomes available through energy supply reporting systems (see Appendix D on Supply Monitoring) and information concerning supply and distribution problems.

2.3.2 PHASE II - ASSESS AND TAKE ACTION - RESPONSE ACTIVITY

In Phase II, having noticed early signs of what might become an energy emergency, responding agencies intensify data and information collection efforts and ensure that the most recent information is available. This information is analyzed to evaluate potential outcomes and assess possible courses of action contacts throughout state government should be informed of the results of this assessment.

Appropriate action can then be determined. If no action is required, monitoring and evaluation continue and further updates are made as changes occur.

The DEMA Director may recommend to the Governor the need to issue conservation messages and requests for the public to reduce consumption. DEMA may activate a public information program if the shortages persist more than one week.

The DEO, in coordination with the PSC and industry, will advise DEMA on the status of affected fuels, effectiveness of demand reduction measures and supply management issues.

If voluntary measures have been requested from the public, DEMA and DEO staff should assess their effectiveness to see if the fuel shortage is being mitigated. If the measures are working, and the shortage is not increasing, there is no need for additional measures. If, however, monitoring indicates further emergency response measures may be necessary, the DEMA Director may recommend that the Governor declare an Emergency thus activating the Phase III.

2.3.3 PHASE III – ACTIONS AND FEEDBACK

Once a decision has been made that specific state government action is necessary to assure the health, welfare, and safety of citizens, and the continued economic well-being of the state, Phase III activity begins. This includes:

- Implementing programs to maximize available supplies and/or to minimize existing demand levels and monitoring these activities to determine their effectiveness;
- Increasing the level of communication among state agencies and others;
- If the nature of the problem involves multiple states, information sharing among state energy coordinators, using the EEAC website, should begin;
- Convening emergency planning and response organizations to consider actions that might be taken by the various state departments and agencies;

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2010

- If implementation of voluntary programs or other emergency deterrent actions fail to mitigate the emergency, begin implementing additional actions;
- If the situation continues to deteriorate, recommending that a “State of Energy Emergency” be declared (usually by the Governor). The Governor may also be called upon to declare a “State of Disaster.” State legislation regarding “State of Energy Emergency” and/or “State of Disaster” will dictate further action and assign responsibility among pertinent parties; and
- If it appears that all other options available to the state prove inadequate, the next level of mobilization is to request federal assistance.
- Federal assistance would generally be available in the case of a national/international energy emergency;
- The emergency planning agencies and representatives from other state departments, as appropriate, would be responsible for coordinating and monitoring federal programs;
- Federal assistance may be requested sooner without a declaration of a national emergency to provide the following;
 - Waiver federal driver hour requirements;
 - Waiver vehicle fuel air quality standards;
 - Request Coast Guard to intensify ice breaking; and
 - Request Strategic Petroleum Reserve (SPR) or the Northeast Heating Oil Reserves.

Phase III is activated when energy shortages exceed the projected demand and voluntary industry and public conservation plus tariff-required utility and local distribution company mitigation measures have not balanced or reduced the demand for fuel.

DEMA may also determine that the health, safety or welfare of the public is at risk because the energy supply cannot adequately be managed by the open market. In this case, the EOC will decide whether to recommend the declaration of an energy emergency in order to initiate mandatory demand restraint and crisis mitigation measures.

Also, if DEMA determines the health, safety, or welfare of the people is at risk and the energy shortage cannot adequately be handled by the open market, the DEMA Director may recommend to the Governor the need to declare an energy emergency.

Phase III involves all activities initiated during the Phase II, plus any additional voluntary or mandatory programs which may be needed to respond to a worsening energy shortage. The Governor may declare an emergency to impose mandatory programs.

2.3.4 PHASE IV – REVIEW LESSONS LEARNED

As emergency operations are phased out, responding state agencies should evaluate the emergency preparedness programs and activities that were implemented and report the results to interested parties such as the Governor’s Office, cabinet level officers, legislative committees and energy policy councils. Evaluation activities should include:

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2010

- Reports describing the nature of the energy emergency and a chronology of the actions taken to respond to it;
- Evaluation of mitigation actions results and of the effectiveness of specific actions taken to respond to the emergency; and
- Critical reviews of the overall performance of the state's energy emergency plans in addressing an emergency, with recommendations drawn from after action reports for improvements to the plan.

Energy Emergency - Potential Conditions & Probable Impacts		
Conditions (one or more may apply)	Probable Impacts Observed	Media/Public Reaction
A Delaware fuel shortage is brought on by natural disaster such as extensive tornadoes, severe cold or heat, earthquake and flood or man-made actions such as embargo, extended refinery outages, or destruction of fuel producing, storage or transportation property.	During peak driving seasons, gasoline stations curtail hours of operation. Electricity providers invoke rolling, or more extensive, blackouts (see below). Local natural gas distribution companies cannot meet commercial and possibly some residential contract obligations.	Government may be criticized for not taking action soon enough.
Fuel prices continue to rise rapidly.	During winter months, non-contract propane customers experience serious difficulty obtaining fuel.	Fuel shortage issues are reported more frequently. Vulnerable low-income users have increasing difficulty obtaining fuel.
Local fuel product storage is extremely low or exhausted.	Some fuel hoarding may be observed.	Public and energy industry officials are asked to explain the shortage. The press considers blame.
Electricity outage due weather, natural disaster or temporary disruption in coal or national gas is too extensive for tariff based restoration measures to remedy.	Brownouts and blackouts occur. Queuing at service stations is evident. Industrial and commercial gas cutoffs occur.	Local news media will report on electricity outages and gas cutoffs as well as power company response measures. Public impatience grows.
Propane, gasoline and diesel dealers are placed on severe (less than 50%) allocation and have difficulty maintaining delivery of any kind.	Suppliers sharply reduce allocations to dealers who, in turn, find it increasingly difficult to manage customer inquiries.	Public consumption is readily measurable as consumers turn to alternate fuels or go without.
Shortages are at least regional and possibly broader.	Government agencies invoke mandatory mitigation measures.	The public is willing to tolerate intervention and the response to voluntary cut back requests increases rapidly.
Low-income customers require significant financial assistance to obtain fuel.	Economic dislocation in the commercial and industrial sectors occurs.	The danger to vulnerable citizens is featured in the media. Stories about economic loss are featured.
Chart - 2.3.6		

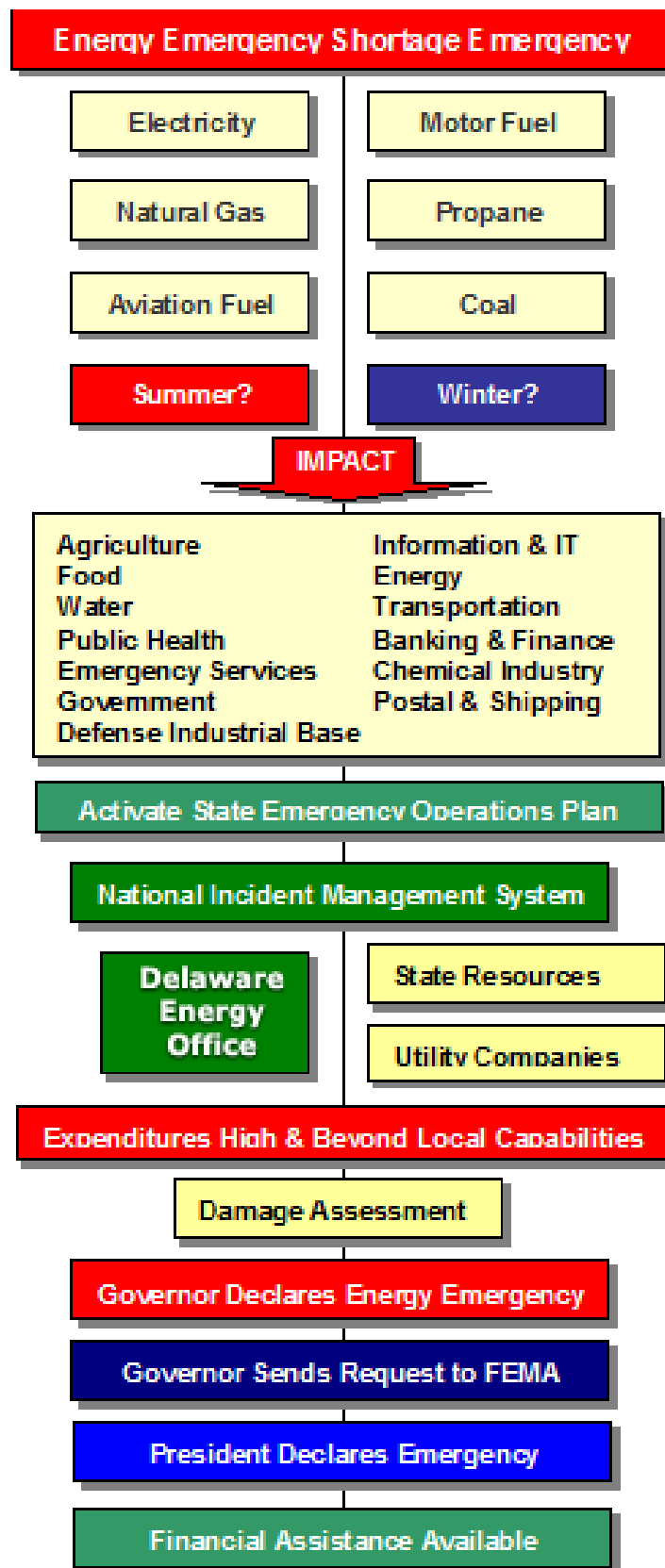


Chart - 2.3.7

CHAPTER 3 – PHYSICAL AND CYBER SECURITY

3.1 BACKGROUND

Some examples of insufficient policies include: an inadequate security policy, an inadequate privacy policy, and unnecessary system access, inadequate continuity of operations or disaster recovery plan, lax or nonexistent policies for replacing updating network and local equipment, and an inadequate security oversight by management. A breakdown in procedures sometimes entails inadequate risk assessment process, inadequate risk management process, and inadequate incident response process. However, procedures breakdowns can also involve failures in sharing or communicating emerging threats and means to address emerging and existing threats. Platform issues include exploits of configuration, hardware, and software/firmware vulnerabilities, whether from current arrangements or upgrades. Sometimes the attacks are multipronged, exploiting multiple seemingly unrelated vulnerabilities. These are all vulnerabilities that contribute to the overall level of security threats.

Lack of sound physical and cyber security creates increased vulnerability. Energy providers are primarily responsible for their own security; however, government can help by working with energy industries to understand the extent of need, the constraints to improvement, and the costs of developing adequate security. Government can then have an effect on viable policies and rules for support. Some examples are:

- Federal and state government has extensive rules pertaining to the reliable delivery of electricity. Energy emergency planning can include general descriptions of existing physical security measures as well as illustrative descriptions of the steps energy companies take to restore power or supply. This information will help planners respond to a disruption efficiently and assist officials with their explanation to the public.
- The infrastructure of the petroleum markets is often understood in general terms only. However, the more a state knows about the location of pipelines, storage, loading terminals, preferred highway delivery routes, and the nature and location of retail outlets, the more it can do to assist in a shortage.

Knowledge

of regional refining facilities and competing finished product markets are other pieces of the physical structure with potential security issues affecting vulnerability. The four main areas of cyber vulnerability

are people, policy, procedure and platforms. Most security threats will originate from one of these areas. Threats from people involve social engineering, phishing schemes, and insider threats. State (and territorial) governments—should establish [Critical Infrastructure and Key Resources \(CIKR\)](#) partnerships; facilitate coordinated information sharing, and enable planning and preparedness for [CIKR](#) protection within their jurisdictions.

- They serve as crucial coordination hubs, bringing together prevention, protection, response, and recovery authorities, capacities; and resources among local jurisdictions, across sectors, and between regional entities. States and territories also act as conduits for requests for federal assistance when the threat or incident situation exceeds the



STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

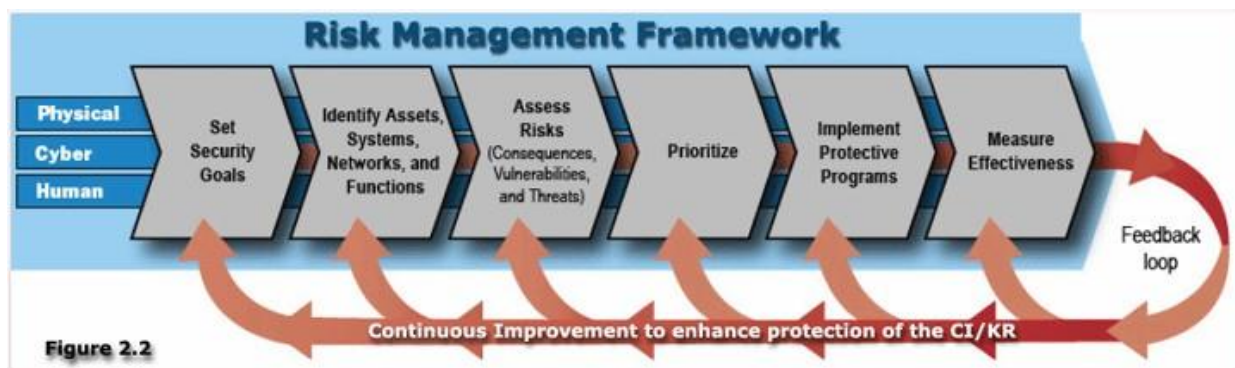
capabilities of public and private sector [CIKR](#) partners at lower jurisdictional levels. States receive [CIKR](#) information from the federal government to support national and state [CIKR](#) protection.

3.1.1 OPERATIONS SECURITY

State program developers are unlikely to need extensive knowledge of energy company operations security. However, it is useful to know that this security is in place and that energy companies train personnel in its implementation. Regarding operational security, the role of government is to ask questions and insist upon site-specific security measures. Public Utility Commissions (PUC) may include operational security requirements in a Certificate of Convenience and Necessity, or other similar rules, for energy entities regulated by the state. PUC Staff needs to be up-to-date on cyber security requirements, potential threats, and understand the National Strategy for Critical Infrastructure. In some states this effort may be limited to issues that arise only in cases before the Commission that involve meeting cyber standards, issue of prudence and cost recovery. In other states this may be addressed more informally as general oversight by Commission Staff and may be a part of the state's homeland security strategy. PUC Staff should be involved in plans for changes to operations security and should have a role in examining the need for and likely results of any proposed changes. Industry can assist state emergency responders by explaining their operations security process and practices. This will help public officials plan and respond accordingly during a shortage.

3.1.2 INFORMATION SYSTEM NETWORK ARCHITECTURE AND PENETRATION TESTING

The realization that delicate and expensive critical infrastructure computerized support systems are vulnerable, clearly focuses the need to ensure that cyber security concerns are an integral part of the planning process. Fortunately, many utilities, petroleum production companies and local delivery companies use proprietary software or systems that are less vulnerable than off-the-shelf software. Several of the nation's major software companies have acknowledged this risk and have cautiously suggested that the U.S. Department of Homeland Security -should examine whether tailored government action is necessary. States may wish to have their own information technology specialists work with the energy industry and the federal government to improve such systems to increase energy assurance. Due to the sensitivity of such detailed information it may not be prudent to include such information in an emergency plan; however,



policy makers and planners will benefit by having up-to-date knowledge of information networks

and their operating characteristics (architecture). In addition, Public Utility Commissions (PUCs) may wish to consider rules for improved information system architecture and adequate penetration testing.

3.1.3 CONSEQUENCE ANALYSIS

Consequence analysis means understanding the effects of an energy disruption. Some consequences are impacts on related energy systems while others are societal impacts such as people displaced from their homes, costs to state and local government, and loss of business income. Widespread energy outages, such as the power failure in the Midwest and Northeast in August 2003, and the petroleum shortage that impacted southeast states following Gustav and Ike in the fall of 2008, clearly highlight the need to consider the consequences of not only energy disruptions, but also actions taken to alleviate them. It is suggested that up-to-date state plans contain sufficient information about current energy infrastructure and operations to help predict possible shortage impacts. This should be part of a thorough vulnerability assessment. Beyond this, planners may wish to assess the operational characteristics of downstream critical infrastructure and account for these when responding to an emergency. ***It is strongly recommended that this be undertaken in close coordination with large power and energy providers whose emergency response actions can lead to devastating downstream system failure.*** Some potential downstream effects might be:

- Failure of petroleum supply infrastructure to function when electric power is interrupted;
- Failure of water supply and purification systems to operate when power is lost;
- Loss of power to buildings, critical air handling, or environmental equipment;
- Outages at refineries and gas processing plants due to electric outages or curtailments in natural gas supply;
- Secondary utility system time-to-failure when back-up storage is exhausted; and
- Failure of information system networks.

The response to downstream impacts may be to alter operational and emergency procedures, provide alerts and warnings where none have been given in the past, or seek to assure that automatic alternatives and backup are understood and acquired.

3.1.4 RISK CHARACTERIZATION

Up-to-date energy emergency plans often contain a vulnerability analysis associating state energy infrastructure with demographics. Risk is also associated with operating any type of energy power system or energy delivery system, and better understanding of this will allow planners to pre-determine the magnitude of possible damage for any given geographical area of impact. Planners should also take into consideration the manner in which the affected demographics will respond to an emergency and the risks associated with those responses. Delaware already prioritizes energy user risk through utility outage and restoration rules or through a critical user list contained in the state petroleum set-aside. Planners re-examine existing priorities, make them current, and update them periodically. Adequate planning may also determine which prioritized energy end-users can best protect themselves with backup supply or access to energy alternatives.

3.1.5 REGIONAL, LOCAL, AND ROLES AND RESPONSIBILITIES

In order to effectively mitigate risk, the [National Infrastructure Protection Plan \(NIPP\)](#) sets out a number of responsibilities for state, local, tribal, and territorial governments and regional organizations. These are summarized below. Collectively, these efforts create a protective envelope for our Nation's Critical Infrastructure and Key Resources ([CIKR](#)). These non-federal efforts are the most visible and tangible to many of the owners and operators—as well as to the public in general. Further increasing partnerships among these organizational levels is crucial towards achieving the highest level of preparedness and risk mitigation.

Delaware and the Mid-Atlantic states are underway to establish [CIKR](#) partnerships; facilitate coordinated information sharing, and enable planning and preparedness for [CIKR](#) protection within their jurisdictions. They serve as crucial coordination hubs, bringing together prevention, protection, response, and recovery authorities, capacities; and resources among local jurisdictions, across sectors, and between regional entities. States and territories also act as conduits for requests for federal assistance when the threat or incident situation exceeds the capabilities of public and private sector [CIKR](#) partners at lower jurisdictional levels. States receive [CIKR](#) information from the federal government to support national and state [CIKR](#) protection and resiliency programs. State and territorial governments should develop and implement state- or territory-wide [CIKR](#) protection programs that reflect the full range of NIPP-related activities. State/territorial programs should address all relevant aspects of [CIKR](#) protection, leverage support from homeland security assistance programs that apply across the homeland security mission area, and reflect priority activities in their strategies to ensure that resources are effectively allocated. Effective statewide and regional [CIKR](#) protection efforts should be integrated into the over-arching homeland security program framework at the state or territory level to ensure that prevention, protection, response, and recovery efforts are synchronized and mutually supportive. [CIKR](#) protection at the state/territory level cuts across all sectors present within the state/territory and should support national, state, and local priorities. The program should also explicitly address unique geographical issues, including trans-border concerns, as well as interdependencies among sectors and jurisdictions within those geographical boundaries. Specific [CIKR](#) protection-related activities at the state/territorial level include:

- Acting as a focal point for and promoting the coordination of protective and emergency response activities, preparedness programs, and resource support among local jurisdictions and regional partners;
- Developing a consistent approach to [CIKR](#) identification, risk determination, mitigation planning, and prioritized security investment, and exercising preparedness among all relevant stakeholders within their jurisdictions;
- Identifying, implementing, and monitoring a risk management plan and taking corrective actions as appropriate;
- Participating in significant national, regional, and local awareness programs to encourage appropriate management and security of cyber systems;
- Acting as conduits for requests for federal assistance when the threat of current situation exceeds the capabilities of state and local jurisdictions and private entities resident within them;

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- Facilitating the exchange of security information, including threat assessments and other analysis, attack indications and warning, and advisories, within and across jurisdictions and sectors therein;
- Participating in and coordinating with the existing NIPP sector partnership model, including Government Coordinating Councils (GCCs) like the state, local, tribal, and territorial GCC; Sector Coordinating Councils (SCCs); and other CIKR governance efforts and SSP planning efforts relevant to the given jurisdiction to include the state's or jurisdiction's customized version of a sector partnership model, such as combined GCCs/SCCs which demand less support [Note: it is not necessary to create parallel councils at the state level, although this may be desired in some states or regions];
- Ensuring that funding priorities are addressed and that resources are allocated efficiently and effectively to achieve the CIKR protection mission in accordance with relevant plans and strategies;
- Sharing information on [CIKR](#) deemed critical from national, state, regional, local, tribal, and/ or territorial perspectives to enable prioritized protection and restoration of critical public services, facilities, utilities, and processes within Delaware;
- Addressing unique geographical issues, including trans-border concerns, dependencies, and interdependencies among the sectors within the jurisdiction;
- Identifying and implementing plans and processes for increases in protective measures that align to all-hazards warnings, specific threat vectors as appropriate, and each level of the [Homeland Security Advisory System \(HSAS\)](#);
- Documenting lessons learned from pre-disaster mitigation efforts, exercises, and actual incidents, and apply that learning, where applicable, to [CIKR](#) protection;
- Providing response and protection where there are gaps and local entities lack resources to address these gaps;
- Identifying and communicating state and territorial needs or requirements for [CIKR](#)-related R&D to DHS; and
- Providing information, as part of the grants process and/or homeland security strategy updates, regarding state priorities, requirements, and [CIKR](#)-related funding projections.

3.1.6 REGIONAL CIKR PARTNERSHIPS

Include a variety of public-private sector initiatives that cross jurisdictional and/or sector boundaries and focus on homeland security preparedness, protection, response, and recovery within or serving the population of a defined geographical area. Specific regional initiatives range in scope from organizations that include multiple jurisdictions and industry partners within a single state to groups that involve jurisdictions and enterprises in more than one state and across international borders. In many cases, state governments also collaborate through adoption of interstate compacts to formalize regionally based partnerships regarding [CIKR](#) protection. [CIKR](#) partners leading or participating in regional initiatives are encouraged to capitalize on the larger area- and sector specific expertise and relationships to:

- Promote collaboration among [CIKR](#) partners in implementing [National Infrastructure Protection Plan \(NIPP\)](#)-related [CIKR](#) risk assessment and protection activities;

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- Facilitate education and awareness of [CIKR](#) protection efforts occurring within their geographical areas;
- Coordinate regional exercise and training programs, including a focus on [CIKR](#) protection collaboration across jurisdictional and sector boundaries;
- Support threat-initiated and ongoing operation-based activities to enhance protection and preparedness, as well as to support mitigation, response, and recovery;
- Work with state, local, tribal, territorial, and international governments and the private sector, as appropriate, to evaluate regional and cross-sector [CIKR](#) interdependencies, including cyber considerations;
- Conduct appropriate regional planning efforts and undertake appropriate partnership agreements to enable regional [CIKR](#) protection activities and enhanced response to emergencies;
- Facilitate information sharing and data collection between and among regional initiative members and external partners;
- Share information on progress and [CIKR](#) protection requirements with DHS, the SSAs, the states, and other [CIKR](#) partners, as appropriate; and
- Participate in the NIPP sector partnership model, as appropriate. Local governments represent the front lines for homeland security and, more specifically, for [CIKR](#) protection and implementation of the [National Infrastructure Protection Plan \(NIPP\)](#) risk management framework and sector partnership model. They provide critical public services and functions in conjunction with private sector owners and operators. In some sectors, local government entities own and operate CIKR such as water, storm water, and gas and electric utilities. Most disruptions or malevolent acts that impact [CIKR](#) begin and end as local situations. Local authorities typically shoulder the weight of initial prevention, response, and recovery operations until coordinated support from other sources becomes available, regardless of who owns or operates the affected asset, system, or network.

Delaware Local and State governments drive emergency preparedness, lead and support NIPP and SSP implementation activities, and encourage the participation of local [CIKR](#) partners; including government agencies, owners and operators, and private citizens in the communities they serve. [CIKR](#) protection focus at the local level includes, but is not limited to:

- Acting as a focal point for and promoting the coordination of protective and emergency response activities, preparedness programs, and resource support among local agencies, businesses, and citizens;
- Developing a consistent approach at the local level to [CIKR](#) identification, risk determination, mitigation planning, and prioritized security investment, and exercising preparedness among all relevant [CIKR](#) partners within the jurisdiction;
- Identifying, implementing, and monitoring a risk management plan, and taking corrective actions as appropriate;
- Participating in significant national, regional, and local awareness programs to encourage appropriate management and security of cyber systems;

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- Facilitating the exchange of security information, including threat assessments, attack indications and warnings, and advisories, among [CIKR](#) partners within the jurisdiction;
- Participating in the [National Infrastructure Protection Plan \(NIPP\)](#) sector partnership model, including GCCs, SCCs, State Local, Tribal and Territorial Government Coordinating Council (SLTTGCC) and other CIKR governance efforts and SSP planning efforts relevant to the given jurisdiction, through direct participation, coordination, or establishment of local coordinating councils as appropriate;
- Ensuring that funding priorities are addressed and that resources are allocated efficiently and effectively to achieve the [CIKR](#) protection mission in accordance with those plans and strategies in effect at the national, state, and local levels;
- Sharing information with [CIKR](#) partners, as appropriate through Homeland Security Information Network (HSIN) and other channels, on [CIKR](#) deemed critical from the local perspective to enable prioritized protection and restoration of critical public services, facilities, utilities, and processes within the jurisdiction;
- Addressing unique geographical issues, including trans-border concerns, dependencies, and interdependencies among agencies and enterprises within the jurisdiction;
- Identifying and implementing plans and processes for step-ups in protective measures that align to all-hazard warnings, specific threat vectors as appropriate, and each level of the HSAS;
- Integrating [CIKR](#) protection into existing plans, such as hazard mitigation plans, emergency operations plans, and contingency plans;
- Documenting lessons learned from pre-disaster mitigation efforts, exercises, and actual incidents, and applying that learning, where applicable, to the [CIKR](#) protection context;
- Conducting [CIKR](#) protection public awareness activities;
- Conducting [CIKR](#) exercises and training; and
- Assuring energy resilience through energy self reliance.

[Tribal government in Delaware](#) roles and responsibilities regarding [CIKR](#) protection generally mirror those of state and local governments as detailed above.

Tribal governments are accountable for the public health, welfare, and safety of tribal members, as well as the protection of [CIKR](#) and continuity of essential services under their jurisdiction. Under the NIPP partnership model, tribal governments ensure close coordination with federal, state, local, and international counterparts to achieve synergy in the implementation of the NIPP and SSP frameworks within their jurisdictions. This is particularly important in the context of information sharing, risk analysis and management, awareness, preparedness planning, protective program investments and initiatives, and resource allocation.



3.1.7 PROTECTING SENSITIVE INFORMATION

Much of the information for critical infrastructure preparedness will either be proprietary for private companies or sensitive for the protection of the nation. Common sense dictates not publishing detailed location maps that could be used by criminals and terrorists. Less apparent is imparting too much detail about information system architecture, consequence analysis, or other vulnerability assessments that seem less direct. A state energy emergency plan may be developed with more knowledge about these characteristics than actually needs to appear in the plan. Most of the emergency protocols contained in a state energy emergency plan are already public knowledge. Since a major purpose of such a plan is to organize these items in a meaningful way for efficient response it may be prudent to keep some response information general rather than specific. It may also be better to keep secure information stored outside of the plan in more than one location for use by authorized individuals only. For additional information on this issue see the [NARUC](http://naruc.org/cipbriefs/) Information Sharing Practices in Regulated Critical Infrastructure States: Analysis & Recommendations that can be found at <http://naruc.org/cipbriefs/>.

In addition, because of the [Freedom of Information Act](#) and sunshine laws in many states, there is a question as to whether sensitive information can be protected from disclosure. In the final analysis accomplishing this is a delicate task and will require careful coordination and cooperation among stakeholders.

3.1.8 ENERGY ASSURANCE PLANNING FOR UTILITIES

[NARUC](#) has suggested a list of planning criteria that incorporate many of the critical infrastructure considerations suggested by DOE as well as state energy office planners. While there is no national government-based organization as closely tied to the petroleum industry as [NARUC](#) is to the utility industry, these criteria may also be applied to the protection of petroleum assets. For example, state planners may wish to ask local petroleum delivery companies, as well as national entities who produce and transport finished oil products, if they have made appropriate business decisions regarding investments in enhanced asset security.

3.1.9 QUESTIONS TO EXPLORE CONCERNING CRITICAL INFRASTRUCTURE:

1. Have key energy assets been identified, digitally mapped, and ranked from a security and vulnerability perspective?
2. Have critical physical, cyber, and vulnerability risks been identified?
3. Have interdependencies, such as the linkage between natural gas supply and the reliability of gas-fired generation, been quantified?
4. What is the planning horizon and geographic scope of the energy assessment process?
5. Does it accurately characterizes and quantifies extended and multiple contingencies?
6. Have appropriate options for response to these vulnerabilities been developed and tested?
7. Have downstream impacts on other sectors (e.g., water, transportation, and telecommunications) and societal impacts been identified?

8. Has the energy sector presented an appropriate business case for making security investments and sought to recover prudent critical infrastructure investments?
9. How has security been integrated into the ongoing business strategy of the energy sector?
10. Has the energy sector implemented changes that will enhance reliability and security, including business continuity?
11. Have investments in utility and end-user efficiencies or alternative energy sources been investigated to minimize the adverse impacts resulting from an energy shortage or emergency?
12. Has a mechanism been established to update planning and response plans?
13. Has there been a -post-event activity to improve the energy sector's best practices?
[NARUC Committee on Critical Infrastructure Technical Briefs. Paper 3: A Primer on Energy Assurance for Public Utility Commissions. April 2005, p. 11-12.](#) The paper discusses both federal and state actions to date regarding the sharing of critical infrastructure information and provides a framework for future cooperation and efforts to harmonize information sharing among state commissions, the FERC and the Department of Homeland Security.
http://www.naruc.org/Publications/CIP_EnergyAssurancePrimer_3.pdf

3.2 CYBER SECURITY

In recent years, the necessity for enhanced cyber security has become an increasingly high priority for the public and the private sectors. The threat of a cyber attack is present within any system that relies on information communication technology and can be detrimental on many levels to consumers, business owners, government, and infrastructure. With a continual and ever-growing dependence on information technology throughout the world, appropriate attention to creating sound cyber security is a critical element of a robust state energy assurance plan. This section provides an overview of what a state should consider in energy emergency planning, including available cyber security resources to assist in planning, prevention, and recovery.

3.2.1 CYBER SECURITY THREATS

- In 2001, hackers penetrated the California Independent System Operator, which oversees most of the state's electricity transmission grid; attacks were routed through California, Oklahoma, and China.
- Ohio Davis-Besse nuclear power plant safety monitoring system was offline for 5 hours due to Slammer worm in January 2003.
- Aaron Caffrey, 19, brought down the Port of Houston in October, 2003. This is thought to be the first well-documented attack on critical U.S. infrastructure.
- In March 2005, security consultants within the electric industry reported that hackers were targeting the U.S. electric power grid and had gained access to U.S. utilities electronic control systems. In a few cases, these intrusions had -caused an impact.¶

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- In April 2009, *The Wall Street Journal* reported that spies hacked into the U.S. electric grid and left behind computer programs that could allow them to disrupt service.

PRIMARY TYPES OF CYBER THREATS		
Modification of data in transit	Modification of transactions across networks.	Financial losses, inconsistent data, breakdown in public trust.
Denial of service	Attacks that slow servers or networks down or bring them to a halt.	Prevent business transactions, frustrate potential users, and damage credibility.
Theft of information / espionage	Penetration attacks resulting in theft of information / intelligence.	Breach of legal and regulatory requirements to maintain confidentiality, financial impacts, breakdown of public trust, damage credibility.
Unauthorized use of resources	Penetration of systems to allow attackers to utilize services—computers, phones, and data. This can also include taking control of servers using them to send spam or launch distributed denial of services attacks.	Financial loss, potential liability, compromise of systems and networks, potential -leapfrogging (moving ahead in order of service).
Data tampering	Modification of content / format of web pages, data (e.g. tax, medical, criminal records).	Damage credibility, legal ramifications of falsification of data.
Spoofing	Impersonating an address internal to a network to gain access. E-mail impersonation.	Potential compromise or destruction of system, damage credibility.
Sniffing	Monitoring network traffic for information (passwords, credit card numbers, etc.)	Compromise or damage of systems and credibility.
Viruses / Internet vandals	Malicious programs and code capable of damage and self-replication.	Business expenses, system down time, lost productivity.
Disasters (natural, technological, human-caused)	Floods, fires, severe storms, act of sabotage / terrorism.	Loss of life and/or critical resources, services to the public, and property.
Physical intruders, vandalism, and theft of equipment	Destruction or theft of resources.	Business expenses, system down time, lost productivity.
Cyber intrusions, of control systems*	This can potentially destroy equipment or disable control systems that could result in infrastructure failures or the use of infrastructure as vehicles of attack.	Loss of life and/or critical resources, services to the public, and property damage to critical control systems and equipment.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

–Information Warfare	<p>Deliberate offensive and defensive use of information and information systems to deny, exploit, corrupt, or destroy an adversary's information, information-based processes, information systems, and computer-based networks while protecting one's own. Primary means of conducting information warfare include:</p> <ul style="list-style-type: none">• Psychological operations to affect the adversary's reasoning.• Electronic operations to deny accurate information to the adversary.• Deception operations to mislead about one's own capabilities or intentions.• Physical destruction of the adversary's information networks and systems.• Security measures to keep adversaries from learning about one's own capabilities and intentions.• Information attack to directly corrupt an adversary's information without being detected.	<p>Information warfare could utilize any of the threats (listed in this table, conceivably achieving any or all of the impacts listed. Information warfare is most often used between nations or between major business Competitors to gain an advantage in a major military operation or business competition.)</p>
<p>Sources: Michigan Department of Information Technology web site; Center for Strategic and International Studies web site; Institute for the Advanced Study of Information Warfare web site. *Category added to reflect control system exploits.</p>		

3.2.2 CYBER SECURITY CONSIDERATIONS IN ENERGY ASSURANCE PLANNING

The following is a list of some, but not all, considerations a state should incorporate into developing an energy assurance planning document to address cyber security issues.

- Consider vulnerabilities to cyber attacks and establish communication lines early among the appropriate parties
- Familiarize yourself with available cyber security resources at the state and federal level as well as within the private sector;
- Educate and train employees about cyber preparedness and good information technology practices;
- Ensure home and office electronic filing systems are backed-up on a regular basis and have up-to-date virus protection;
- Insist that key emergency responders have hard copies of contact information and response plans are readily available;
- Prepare a response plan that includes a provision that assumes the federal government may also be under a cyber attack, and ensure that it is updated regularly; and
- Similar to electricity power emergencies, cyber systems should have *black start* capability. That is, a backup should be available that is outside of, but capable of connecting to, and repairing any compromised IT system that is critical to energy delivery, safety, and security.

3.2.3 FEDERAL AND STATE CYBER SECURITY RESOURCES

There is much being done to address cyber security and it is important that states familiarize themselves with the activities underway and resources available at both the federal and state level to address cyber attacks.

Department of Homeland Security—the Homeland Security Act of 2002 required the first-ever all encompassing coordinated national critical infrastructure and key resources protection effort. As part of this effort, the Information Technology Sector Specific Plan (IT SSP) was collaboratively developed by the Department of Homeland Security's National Cyber Security Division as the Sector Specific Agency for the IT Sector and sector security partners, including the IT Sector Coordinating Council and IT Government Coordinating Council. The IT SSP does not provide specific procedures for individual Sector entities operations and is not designed to guide federal or state government efforts to respond to events; rather it is a planning document that provides guidance on how public and private partners will work together to protect IT Sector CI/KR. The IT SSP is a living document designed to evolve with the ever-present threats and vulnerabilities faced by our nation. <http://www.dhs.gov/xlibrary/assets/nipp-ssp-information-tech.pdf>

The United States Computer Emergency Readiness Team (US-CERT)— Established in 2003, as a partnership between the Department of Homeland Security and the public and private sectors to protect the nation's internet infrastructure by coordinating defense against and response to cyber attacks, US-CERT is responsible for:

- Analyzing and reducing cyber threats and vulnerabilities;
- Disseminating cyber threat warning information; and
- Coordinating incident response activities.

US-CERT interacts with federal agencies, industry, the research community, state and local governments, and others to disseminate reasoned and actionable cyber security information to the public—providing a way for citizens, businesses, and other institutions to communicate and coordinate directly with the United States government about cyber security. <http://www.us-cert.gov/aboutus.html>

U.S. Department of Energy— The Cyber Security Office within the U.S. Department of Energy's Office of the Chief Information Officer is responsible for implementing and maintaining a comprehensive cyber security program that is effective across its diverse missions and large array of interdependent networks and information systems. The office published a revitalization plan in 2006 designed to strengthen the Department's networks and establish a vital, institutionalized cyber security program. <http://cio.energy.gov/cybersecurity.htm>
<http://cio.energy.gov/documents/2006DOECyberSecurityRevitalizationPlan.pdf>

The North American Electric Reliability Corporation (NERC) — Standards CIP-002 through CIP-009 (the Critical Cyber Asset Identification portion of the Critical Infrastructure Protection standards) provides a cyber security framework for the identification and protection of Critical Cyber Assets to support reliable operation of the Bulk Electric System. These are mandatory and enforceable standards that entail a comprehensive compliance program that includes periodic reporting, self-certification spot check, and compliance audits.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- [CIP-002-2](#)—Critical Cyber Asset Identification requires the identification and documentation of the Critical Cyber Assets associated with the Critical Assets that support the reliable operation of the Bulk Electric System. These Critical Assets are to be identified through the application of a risk-based assessment.
- [CIP-003-2](#)—Security Management Controls requires that Responsible Entities have minimum security management controls in place to protect Critical Cyber Assets.
- [CIP-004-2](#)—Personnel and Training, requires that personnel having authorized cyber or authorized unescorted physical access to Critical Cyber Assets, including contractors and service vendors, have an appropriate level of personnel risk assessment, training, and security awareness.
- [CIP-005-2](#)—Electronic Security Perimeters), requires identification and protection of the Electronic Security Perimeter inside which all Critical Cyber Assets reside, as well as all access points on the perimeter.
- [CIP-006-2](#)—Physical Security of Critical Cyber Assets is intended to ensure the implementation of a physical security program for the protection of Critical Cyber Assets.
- [CIP-007-2](#)—System Security Management requires Responsible Entities to define methods, processes, and procedures for securing those systems determined to be Critical Cyber Assets, as well as the non-critical Cyber Assets within the Electronic Security Perimeter.
- [CIP-008-2](#)—Incident Reporting and Response Planning, ensures the identification, classification, response, and reporting of Cyber Security incidents related to Critical Cyber Assets.
- [CIP-009-2](#)—Recovery Plans for Critical Cyber Assets ensures that recovery plans are put in place for Critical Cyber Assets and that these plans follow established business continuity and disaster recovery techniques and practices.

NERC developed these standards to recognize the differing roles each entity plays in the operation of the Bulk Electric System, the criticality and vulnerability of the assets needed to manage Bulk Electric System reliability, and the risks to which they are exposed. The Standards are available at: <http://www.nerc.com/page.php?cid=2|20>

In October 2007, US House of Representative, Subcommittee on Emerging Threats, Cyber Security, and Science and Technology held a hearing on the cyber threat to control systems, focusing specifically on the susceptibility to the Bulk Power System discovered by engineers at the Idaho National Laboratory. The vulnerability, known as -Aurora, could enable a targeted attack on infrastructure connected to the electric grid, potentially destroying the machines and causing catastrophic losses of power for an undeterminable amount of time. Since the hearing NERC has been working to reduce the risk of this vulnerability to power systems.

Federal Bureau of Investigation (FBI)—[InfraGard](#) is a program that began in 1996 as a local effort to gain support from the information technology industry and academia for the FBI's investigative efforts in the cyber arena. The program expanded over time and exists today as an association of businesses, academic institutions, state and local law enforcement agencies, and other participants dedicated to sharing information and intelligence to prevent hostile acts against the United States. The goal of [InfraGard](#) is to promote ongoing dialogue and timely communication between members and the FBI. [InfraGard](#) members gain access to information

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

that enables them to protect their assets and in turn give information to government that facilitates its responsibilities to prevent and address terrorism and other crimes. <http://www.infragard.net/> Multi-State Information Sharing and Analysis Center (MS-ISAC) is a collaborative organization with participation from all fifty states, the District of Columbia, local governments, and U.S. Territories with a mission to provide a common mechanism for raising the level of cyber security readiness and response in each state and with local governments and the territories. The MS-ISAC provides a central resource for gathering information on cyber threats to critical infrastructure from the states and providing two-way sharing of information between and among the states and with local government. <http://www.msisac.org/>

National Institute of Standards and Technology (NIST)— the Energy Independence and Security Act (EISA) of 2007, assigned NIST the primary responsibility to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability and assure cyber security of the smart grid devices and systems. NIST has established itself as an agency that is technically knowledgeable and able to work collectively with industry and other government agencies, including the Department of Energy (DOE) and the Federal Energy Regulatory Commission (FERC).

<http://nist.gov/smartgrid/>

3.2.4 DELAWARE'S ROLE IN CYBER SECURITY IN THE ENERGY SECTOR

Delaware is playing a supportive role in assuring adequate levels of cyber security in the energy sector. In the petroleum area, the American Petroleum Institute has adopted guidelines that address the needs of the petroleum sector and it is important that states that have responsibilities for petroleum are aware of those standards. In the area of gas and electric, the Public Service Commission (PSC) has a role in assuring the adequacy and reliability of natural gas and electricity and this extends to cyber security which, if breached, could impact the reliability of supply. In some PUCs and PSCs this activity may be limited to actions taken as part of formal proceedings. In other states, in addition to case work, more informal discussions occur between PSC and utilities and such efforts may be tied to the state's homeland security and critical infrastructure efforts. <http://www.api.org/policy/otherissues/upload/Security.pdf>

3.2.5 COMMITTEES & WORKING GROUPS

The committees and working groups listed below include links from this Web site and from Department of Homeland Security component agency Web sites.

Homeland Security Advisory Council. Provides advice and recommendations to the Secretary on matters related to homeland security. The Council comprises leaders from state and local government, first responder communities, the private sector, and academia.

Critical Infrastructure Sector Partnership. Critical infrastructure protection is a shared responsibility among federal, state, local and tribal governments, and the owners and operators of the nation's critical infrastructure and key resources.

The DHS Data Privacy and Integrity Advisory Committee. Advises the Secretary of the Department of Homeland Security and the Department's Chief Privacy Officer on programmatic, policy, operational, administrative and technological issues relevant to the Department that affect individual privacy, data integrity and data interoperability and other privacy related issues.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

[National Infrastructure Advisory Council \(NIAC\)](#). The National Infrastructure Advisory Council provides the President, through the Secretary of Homeland Security, with advice on the security of critical infrastructures, both physical and cyber, supporting sectors of the economy.

[Critical Infrastructure Partnership Advisory Council \(CIPAC\)](#). The Critical Infrastructure Partnership Advisory Council represents a partnership between government and critical infrastructure / key resource (CIKR) owners and operators and provides a forum in which they can engage in a broad spectrum of activities to support and coordinate critical infrastructure protection.

[State, Local, Tribal and Territorial Government Coordinating Council](#). The State, Local, Tribal and Territorial Government Coordinating Council works with the federal government and critical infrastructure/key resources owners to protect the nation's critical infrastructure.

[Interagency Security Committee](#). The Interagency Security Committee's mandate is to develop standards, policies and best practices for enhancing the quality and effectiveness of physical security in, and the protection of, nonmilitary federal facilities in the United States.

The [Homeland Security Information Network Advisory Committee](#) provides a balanced perspective of the federal, state, local, tribal and private sector communities whom they represent.

Finally, state agencies should have, or develop some level of, in-house understanding and expertise on cyber security. By doing so as they prepare assurance plans, or related response documents, they can work to assure that these requirements are met. Becoming familiar with the various standards that are in place, and those that might be developed, that govern cyber security requirements is important to adequately carry out regulatory and programmatic responsibilities. This is clearly an area for which attention is growing and one that needs to be the focus of attention by the staff of energy offices and Public Utility Commissions. Those agencies that do not currently have individuals assigned to this responsibility should give serious consideration to assuring that they have some level of knowledge to address this important issue.

CHAPTER 4 – ROLES AND RESPONSIBILITIES

4.1 ORGANIZATION

The responsibilities for responses to energy emergencies in the State of Delaware are delegated to the Department of Public Safety (DPS)¹, the Delaware Energy Office (DEO)², Delaware Public Service Commission (PSC), and the Delaware Emergency Management Agency (DEMA)³. In the event of an energy emergency, the DEO, PSC, and DEMA will direct all response activities and may be assisted by other appropriate government agencies when required by the DEO, PSC, and DEMA.

The plan will be activated by the DEO, PSC, and DEMA if conditions warrant declaring an energy emergency. The DEO, PSC, and DEMA will direct all necessary energy emergency response actions, described below.

Other state agencies presented below will undertake the energy emergency response functions under the direction of the DEO, PSC, DEMA, and/or the Office of the Governor⁴.

4.2 RESPONSIBILITIES OF STATE AGENCIES

The responsibilities for state government entities in the event of energy emergency are presented below.

4.2.1 EXECUTIVE DEPARTMENT (ED)

4.2.2 OFFICE OF THE GOVERNOR (OG)

Ultimate authority for all emergency response activities in the State of Delaware is vested in the Governor. The governor, acting in accordance with the appropriate laws of the State, declares all emergencies and authorizes all response activities. The Office of the Governor may issue voluntary energy conservation appeals and mandatory energy conservation directive regulations under energy emergency declarations. The Office of the Governor authorizes all energy emergency response activities undertaken by the DEO and DEMA and maintains close and continuous communications with appropriate federal, state, and local government agencies during energy emergencies. The governor will direct emergency operations through the regularly constituted government structure (DEMA).

When a critical level of an energy resource is reached, the governor may, on the

¹ Department of Public Safety (DPS)

² Delaware Energy Office (DEO)

³ Delaware Emergency Management Office (DEMA)

⁴ Office of the Governor

recommendations of the DEO, DEMA, or at the request of a local governing body, declare a state of emergency to exist as a result of a resource shortage. By executive order, the governor may announce to the public the emergency actions to be imposed to conserve or limit the use of available energy supplies. To the extent feasible, the governor will provide advance copies and interpretation of such executive orders to concerned state agencies and local governments before they are released to the press and the general public. State emergency communications systems may be used for this purpose. Upon the declaration of a State of Energy Emergency, the Delaware Emergency Management Agency (DEMA) Director and DEO will coordinate state assistance to local governments from the emergency operations center.

4.2.3.1 OFFICE OF MANAGEMENT AND BUDGET (OMB)⁵

4.2.3.1.2 FLEET SERVICES

Fleet Services coordinates the rideshare and vanpool programs for the State.

4.2.3 DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL (DNREC)⁶

DNREC coordinates with the Environmental Protection Agency (EPA) to modify air pollution restrictions in the event that low sulphur content fuel is not available within the State.

4.2.4.1 DELAWARE ENERGY OFFICE (DEO)

The DEO and DEMA are the lead agencies to direct, undertake, and coordinate the State's energy emergency response activities as presented in the plan. The DEO and DEMA maintain a high level of preparedness to direct energy emergency response activities. The DEO and DEMA staff is responsible for carrying out the following steps to achieve and maintain operational readiness of the plan:

- Prepare and implement plans to assure adequate supply of energy products for the State of Delaware
- Maintain current databases for energy product suppliers
- Monitor international and domestic events for probable impact on the State's energy supplies and prices
- Regularly review and update the plan to ensure that the energy emergency response strategies reflect the changing trends and conditions in the world energy industry
- Conduct regular training of the DEO and DEMA staff, as well as representatives from other government agencies, local governments, energy suppliers, appropriate institutions, and private sector entities, to identify the roles and responsibilities of each in responding to an energy emergency.

⁵ Office of Management and Budget (OMB)

⁶ Department of Natural Resources and Environmental Control (DNREC)

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- Conduct periodic tests of the plan, under simulated emergency conditions, to reinforce the training process of the DEO staff as well as offer other government agencies, local governments, and energy suppliers an opportunity to test their own plans.
- Maintain communications with other state entities, agencies, and industries involved in energy emergency mitigation.
- Continue to improve federal government and regional coordination and information exchange.
- Prepare detailed guidelines and appropriate forms necessary for implementation of the plan response programs including the Fuels Set-Aside Program.
- Maintain protocol with the Governor's Office regarding when and where the DEO staff should participate in the public affairs program.

During an energy emergency, the DEO in coordination with DEMA will:

- Select and direct state agencies in the energy emergency response activities.
- Monitor the status of relevant energy supply indicators.
- Undertake appropriate analyses of the energy emergency status.
- Serve as a primary contact for all energy emergency public affairs activities.
- Conduct post-emergency analysis and make recommendations to change the plan's functions, responsibilities, etc.
- If an energy emergency is proclaimed, the contingency manager implements the emergency response programs which the governor, upon recommendation by the DEO, directs.
- The DEO will proceed with specific elements of the plan. Using the data and analysis provided by the staff, the DEO will present recommendations to the governor on how best to respond to the anticipated energy problem.

4.2.4.1.1 CONTINGENCY PLANNING MANAGER⁷

The contingency planning manager, who reports to the DEO, is responsible for supply monitoring, data collection, program implementation, and log maintenance of all activities. The manager initiates multi-level communications with government and private industry.

4.2.4.1.2 DATA COORDINATOR

The data coordinator, under the direction of the contingency manager, is responsible for the collection, analysis, and internal distribution of relevant data.

4.2.4.1.3 EMERGENCY SUPPORT FUNCTION ESF-12 ADVISORY GROUP⁸

⁷ Contingency Planning Manager

⁸ Emergency Support Function ESF-12 Advisory Group (ESF-12)

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

The ESF-12 Advisory Group is composed of representatives from gas producers, electric utility companies, municipal utilities, industry, Delaware Petroleum Council, the DEO, and DEMA (see figure 4.2). Group members will serve in an advisory capacity to the DEO and DEMA.

- The ESF-12 Group will consider matters relating to all energy emergency functions and will advise the DEO and DEMA on matters relating to the plan that it deems appropriate.
- The group will meet periodically to provide advice to the DEO and DEMA on energy-related matters. The group will review and comment on this plan as appropriate.
- The ESF-12 Group will designate certain industry members who shall have responsibility for the management of available fuel energy supplies such as electricity, petroleum products, natural gas, propane/butane, and coal
- The ESF-12 Group industry members, in coordination with the DEO and DEMA, will establish and maintain liaison with appropriate federal, state, and appropriate local agencies and energy industry contacts to ensure maximum advance warning of an energy resource shortage.
- The ESF-12 Group will also advise and coordinate with the DEO and DEMA implementation of federal programs dealing with conservation and other emergency management considerations of the energy commodity they are tasked to monitor, in the event of an energy emergency.
- Management of a commodity will include the maintenance of current supply and demand data, and in the event of an energy emergency, the implementation of approved conservation, allocation, regulation, or other control programs as required ensuring that the distribution of available supplies remains consistent with approved priorities.
- Prior to pursuing a course of action regarding its commodity, the consequences of the action on other energy resources will be considered. Shortages of an energy commodity inter-relate with and affect, both directly and indirectly, the available supply of other energy resources.
- If it is determined that the price increases have a disproportionate impact on low-income households, the ESF-12 Group, in coordination with DEMA and the DEO, will recommend to the governor that the Economic Assistance Programs be implemented. These programs are designed to help mitigate financial hardships by distributing public funds to low-income households.
- The members of the ESF-12 Group, with major responsibility for contingency planning, assist the DEO and DEMA in briefing the governor on the status of an energy shortage.

4.2.4 DEPARTMENT OF STATE (DS)

4.2.4.1 PUBLIC SERVICE COMMISSION (PSC)⁹

The Public Service Commission is authorized by the Delaware General Assembly under Title 26, Delaware Code, to regulate investor-owned utilities and companies providing electric, natural gas, water, telecommunications and cable services for public use within the unincorporated areas of the State of Delaware. The PSC receives and maintains the curtailment plans of appropriate natural gas, electricity, heating oil, and propane products. During an energy shortage, the PSC also monitors the impacts on the State's economy. The PSC, DEMA and the DEO and the ESF-12 Group

⁹ Public Service Commission (PSC)

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

members will determine the effects of rising prices on various population sectors, particularly on low-income households. A PSC member serves as an advisor to the ESF-12 Group.

4.2.5 DEPARTMENT OF SAFETY AND HOMELAND SECURITY (DSHS)¹⁰

4.2.5.1 DELAWARE EMERGENCY MANAGEMENT AGENCY (DEMA)

DEMA is the operational entity within state government that coordinates the emergency activities of all state agencies and departments during time of war, a state of emergency, or a local emergency. DEMA manages the State's emergency communications system. This system connects the three Delaware counties to the DEMA emergency operations center in Smyrna. In the event that an energy emergency reaches a level of severity requiring communication capabilities beyond the SEO's capacity, the SEO will communicate through DEMA to monitor energy supply and distribution problems at the local level, and to ensure a coordinated, consistent emergency response by the State.

- Plan and conduct periodic training seminars to assure proper updating of the plan.
- When the governor declares a State of Emergency due to an energy crisis, DEMA will assist the SEO and the ESF-12 Group in coordinating energy-related activities of state departments, divisions, and agencies responsive to the plan.
- Assist the SEO in coordinating the implementation of state and federal energy emergency response programs for the State.
- In the event of a State of Energy Emergency, the director of DEMA will request that a representative from the DEO, ESF-12 Group, appropriate state agencies, state departments, and quasi-public relief organizations report to the State Emergency Operations Center (SEOC) to assure centralized coordination of response according to guidelines established by the State's emergency response plan.
- When an energy emergency exists or is imminent, state agencies will support the SEO and DEMA and assist the ESF-12 Group as requested to the extent of their capabilities.
- Under normal operating conditions, members of the ESF-12 Group will monitor their energy products and be prepared to respond to anticipated or minor shortages in accordance with established priorities and this plan. When conditions deteriorate and shortages become more severe, the governor may declare a State of Energy Emergency to implement more stringent management control measures.
- If the magnitude of the energy shortage warrants, the governor may seek assistance from federal agencies based on their own statutory authority.

4.2.6 DEPARTMENT OF HEALTH AND SOCIAL SERVICES (DHSS)¹¹

The Department of Health and Social Services is responsible for consolidating and providing

¹⁰ Delaware Department of Safety and Homeland Security (DSHS)

¹¹ Delaware Department of Health and Social Services (DHSS)

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

information to local governments on emergency assistance to individuals and families through ongoing state and federal programs.

4.2.6.1 DIVISION OF STATE SERVICE CENTERS

Prepare and maintain current, information pertaining to dealing public assistance requirements, with the assistance of the Division of Aging, other state agencies, and quasi-public and private relief organizations. Assist local governments in cooperation with the Community Services Office and local Social Services in providing assistance for individuals and families who are financially unable to pay for fuel to meet human needs. Provide, where possible, overall coordination of the activities of quasi-public and private relief organizations at the local level through the State Service Center Offices.

4.2.6.2 DIVISION OF AGING

Render assistance to senior citizens during periods of energy shortages, as local resources permit. Coordinate with and assist local governments during energy emergencies.

4.2.6.3 DIVISION OF PUBLIC HEALTH (DPH)¹²

Recommend priorities for fuel distribution to health care facilities to include fuel for emergency vehicles. Provide assistance and advice on proper levels of heat to ensure health and safety.

4.2.6.4 DIVISION OF SOCIAL SERVICES

Provide cash assistance and food stamp program benefits to individuals and families who become eligible resulting from income reduction due to energy emergency conditions. Provide information to applicants about other resources which communities have made available to meet the emergency needs. Coordinate with other service providers as appropriate.

4.2.6.5 ECONOMIC ASSISTANCE COORDINATOR

The governor will designate an economic assistance coordinator to serve on the multi-agency task force. The coordinator must keep abreast of all current state and federal legislation and executive orders that may affect Delaware's Economic Assistance Programs (additional duties and responsibilities of the coordinator can be found in Chapter 6).

¹² Division of Public Health (DPH)

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

4.2.7 DEPARTMENT OF TRANSPORTATION (DELDOT)¹³

The Delaware Department of Transportation (DELDOT) coordinates rideshare, vanpool, and other mass transportation programs throughout the State which can be relied upon during an emergency to reduce transportation fuel demand. The DEO will rely upon DELDOT's extensive experience in operating the State's highway system when developing an emergency response strategy for the transportation sector.

- Implement, as required, pertinent portions of the Federal Emergency Highway Traffic Regulation Plan (USDOT).
- Lifting of operators hours for fuel delivery
- Issue overweight permits for fuel-hauling vehicles during the period of the energy emergency.

4.2.8 DEPARTMENT OF LABOR (DL)

- Recommend priorities for fuel distribution to business and industries through the Fuel Management Advisory Board.

4.2.8.1 DIVISION OF UNEMPLOYMENT INSURANCE

- Assist in the job placement and emergency unemployment assistance administered through the division by the U.S. Department of Labor.
- Arrange for payment of unemployment compensation made to individuals who are unemployed as a result of resource shortage.

4.2.9 DEPARTMENT OF AGRICULTURE (DA)

- Recommend priorities for fuel distribution to farms, dairies, and agricultural-related businesses through ESF-12 Group.
- Provides information to the ESF-12 Group concerning gasoline stations operating in Delaware through its Weights and Measures Division.

¹³ Delaware Department of Transportation (DELDOT)

5.0 DELAWARE PETROLEUM SUPPLY AND USAGE DATA

([State Petroleum Energy Profile](#)) ([Delaware Motor Fuel Volumes](#))

Petroleum in Delaware - The Delaware City petroleum refinery supplies petroleum products to regional markets. Delaware is one of the few States that require the statewide use of reformulated motor gasoline blended with ethanol. The State's largest consumer of energy is the industrial sector, in part due to several energy-intensive industries, including petroleum refining, chemical production, and other manufacturing.

Delaware has a single medium-sized refinery in Delaware City. Since the State has no crude oil production, the refinery relies on crude oil supplies delivered via the Delaware River. The Delaware City refinery supplies petroleum products to regional markets. Additional petroleum products are supplied to Delaware via shipments received at ports in the Wilmington area and along the Delaware River. Additional petroleum products are supplied to Delaware retail / wholesale locations via transport trucks loaded at a large storage facility located at the Port of Wilmington and also via trucks located at marine supplied terminal facilities located along the Delaware River in Pennsylvania and New Jersey; and also from inland terminals supplied via private and common carrier pipeline networks.



Delaware requires the use of reformulated motor gasoline blended with ethanol throughout the State. About 30% of fuel sold nationwide is reformulated gasoline. Approximately one-fifth of Delaware households use fuel oil as their primary energy source for home heating. Petroleum products fall into three major categories: fuels such as motor gasoline and distillate fuel oil (diesel fuel); finished non-fuel products such as solvents and lubricating oils; and feed-stocks for the petrochemical industry such as naphtha and various refinery gases. demand is greatest for products in the fuels category, especially motor gasoline. ([source](#)) ([Delaware Transportation Services Office of Retail Gasoline Sales](#))

Petroleum products contribute about 40.2 percent of the energy used in the United States. This is a larger share than any other energy source including natural gas with a 23 percent share, coal with about a 22 percent share, and the combination of nuclear, hydroelectric, geothermal and other sources comprising the remaining 14 percent share. It is projected that petroleum consumption in the United States will increase by 1.5 percent annually, reaching 27.9 million barrels per day by the year 2025. Although petroleum consumption will continue to increase overall, its share of total energy use has shrunk over the past several decades as a result of conservation efforts, fuel efficiency improvements, and growing use of alternative sources of energy.

Petroleum products, especially motor gasoline, distillate (diesel) fuel, and jet fuel, provide virtually all of the energy consumed in the transportation sector. Transportation is the greatest single use of petroleum, accounting for an estimated 67 percent of all U.S. petroleum

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

consumed in 2005. The industrial sector is the second largest petroleum consuming sector and accounts for about 23 percent of all petroleum consumption in the U.S. Residential/Commercial and the electric utility sectors account for the remaining 8 percent of petroleum consumption. Demand for petroleum products in the United States averaged 19.7 million barrels per day in 2005. This represents about 3 gallons of petroleum each day for every person in the country. By comparison, petroleum demand averaged about 2 gallons per person per day in the early 1950's and nearly 3.6 gallons per person per day in 1978.

Fuel products account for nearly 9 out of every 10 barrels of petroleum used in the United States. The leading fuel, motor gasoline, consistently accounts for the largest share of petroleum demand. Demand for motor gasoline alone accounts for more than 44 percent of the total demand for petroleum products. Other petroleum fuels include distillate fuel oil (diesel fuel and heating oil), liquefied petroleum gases (LPG's) (including propane and butane), jet fuel, residual fuel oil, kerosene, aviation gasoline, and petroleum coke. Motor gasoline is chiefly used to fuel automobiles and light trucks for highway use. Smaller quantities are used for off-highway driving, boats, recreational vehicles, and various farm and other equipment.

A number of factors influence the demand for motor gasoline. For example, rising gasoline prices in the 1970's encouraged consumers to reduce discretionary driving and stimulated consumer demand for smaller, more fuel efficient automobiles. The Corporate Average Fuel Economy (CAFÉ) Standards established by the Energy Policy and Conservation Act of 1975 set mileage standards for new cars that helped reduce gasoline demand even more as new, more fuel efficient cars replaced older, less efficient cars. The effects of the market shift to smaller cars and the fuel efficiencies resulting from the CAFÉ standards continued to restrain growth in gasoline demand through the 1980's. However, by the mid-1990's, fuel efficiency growth slowed considerably as low gasoline prices and rising disposable income spurred consumers to buy less fuel efficient light trucks, vans, and sport utility vehicles.

5.1 DELAWARE MOTOR FUEL USE

[Figure 5.1](#) describes pipes and refineries and motor fuel delivery into and out of Delaware. [Figure 5.2](#) provides information about the motor fuel use in the U.S. and [Figure 5.3](#) provides statistics for the State of Delaware. Petroleum is supplied to the State of Delaware in crude state from Canada, South America, and Middle East. Every year over 500 large tankers bring

	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10
Motor Gasoline	988.7	968.2	925.7	897.7	1,006.2	1,069.5
Regular	854	835.3	790.8	772.5	861.1	909.8
Reformulated Regular	854	835.3	790.8	772.5	861.1	909.8
Midgrade	19.8	18.4	17.3	16.8	19.2	20.2
Reformulated Midgrade	19.8	18.4	17.3	16.8	19.2	20.2
Premium	115	114.5	117.6	108.5	125.9	139.5
Reformulated Premium	115	114.5	117.6	108.5	125.9	139.5
Reformulated (All Grades)	988.7	968.2	925.7	897.7	1,006.2	1,069.5
Aviation Gasoline	W	W	W	W	W	W
Kerosene-Type Jet Fuel	8.6	10.2	7.2	8.9	8.4	7.9
Propane (Consumer Grade)	112.6	170.7	250.1	226.9	138.6	75.6
Total Distillate and Kerosene	266.3	320.5	355.6	402.1	295.4	242.5
Kerosene	W	W	12.5	W	W	W
No. 2 Distillate	261.8	310.4	343.1	389.9	W	W
No. 2 Fuel Oil	W	W	W	W	W	W
No. 2 Diesel Fuel	NA	NA	NA	NA	NA	NA
Ultra Low-Sulfur	182.5	165.5	162.8	175.8	187.6	192
Low-Sulfur	W	W	W	19.6	10.1	13.2
Residual Fuel Oil	346.6	W	63	W	W	345.2
Sulfur Greater Than 1%	W	W	W	W	W	W

W = No Data Reported; NA = Not Applicable; NA = Not Available; W = Withheld to avoid disclosure of individual company data.

Figure 5.4

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

crude to the six refineries along the Delaware River. This includes the Delaware City Refinery (owned by the Delaware City Refining Corporation) at the Delaware City Port. Many of these ships carry up to 2 million barrels of crude oil (84,000,000 gallons). In addition to the Delaware City refinery, the market is supplied via a large storage terminal in Wilmington, DE. The Magellan terminal at the Port of Wilmington, De offers 1.37 million barrels of clean (gas and USLD) storage, and can support truck deliveries of 45MBPD.



Figure 5.5 - Google Map view of the Valero Refinery in Delaware City, DE. Note the 8,500 gallon transport trucks lined up to fill-up with gasoline and diesel fuel. Also, railroad tank cars and Propane Delivery Trucks can be loaded at this location.

5.2 FUEL DELIVERY

5.2.1 DELAWARE CITY REFINERY

Background: - The Delaware City Refinery is located on 5,000 acres just south of Wilmington Delaware. John Paul Getty built the Delaware City Refinery in the early 1950's because he had found a source of crude in the Neutral Zone that was too high in sulfur for any US Refinery to refine (see Figure 5.5 above). The Delaware City Refinery was built to handle crude that contained sulfur as high as 3 %. This refinery has changed hands many times over the past 50 years and once was: Texaco, Star, Motive, Shell, and now Valero. The refinery is located on 5,000 acres of ground in Delaware City. It is rated at 210,000 barrels per day and could produce near 3 million gallons of gasoline per day. Its production included conventional and reformulated gasoline, low-sulfur diesel, home-heating oil.

Delaware City produced and sold: gasoline, diesel fuel, heating oil, propane, and ultra-low-sulfur diesel; and many specialty chemicals like benzene, toluene, oxygen, nitrogen, and sulfuric acid. The site includes a large (166' wide x 123' deep) propane cavern know as "frozen earth" that stores upwards of 20 million gallons of propane. This cavern is filled during the summer months when demand for propane is low and sold off during the winter as demand increases. Due to the size of this cavern the supply of propane was never a problem for local vendors in the area. Contributing to the plant's efficiency was a 1,800-tons-per-day petroleum-coke gasification unit. The refinery's petroleum coke production is sold to third

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

parties or is gasified into fuel. The 180-megawatt co-generation power plant was designed to supply electricity and steam to the refinery. The delivery of crude to the refinery was directly at the Valero piers or by barge. The products were shipped out by pipeline, barge or through the truck loading rack.

The closest refinery to the Delmarva Peninsula is the Sunoco Marcus Hook Refinery in Pennsylvania, approximately 57.5 miles away and 1.5 hours of driving time to Dover, DE. The Marcus Hook Refinery (opened in 1902) is located on the Delaware River and is the second largest refinery in the northeast. The Marcus Hook Refinery is capable of processing 190,000 barrels a day. Pending finding a buyer, Sunoco began shutting down the Marcus Hook Refinery in December 2011, and anticipates ceasing all operations in July 2012. During 2011, more than 385 MB of crude oil refining capacity was idled in the Delaware Valley.

5.3 MOTOR FUEL SHORTAGE – WHAT CAN GO WRONG?

A motor fuel shortage emergency could occur due to a disruption in the supply system to include a mix of the following factors:

- Unloading facilities disrupted
- Ship accident in channels
- Electric power outage causing gasoline stations to close (Valero Refinery can operate on emergency power)
- Truck transport becomes constrained due to ice or snow.
- Shortage due to labor strikes.
- Extended cold snap combined with just-in-time inventory management.
- Product shortage due to high export rate.
- Imports reduced for political or economic reasons.
- Imbalance in supply and demand.

The portion of Delaware lying south of the Chesapeake and Delaware Canal is somewhat more vulnerable to situational supply shortages in instances where any of the bridges that span the canal are closed due to weather conditions. This could isolate Dover and areas to the south from sources of supply in New Castle County, Delaware; Pennsylvania and New Jersey.

5.4 MONITORING A MOTOR FUEL SHORTAGE

There are several tools to monitor motor fuel supply and demand in Delaware:

- [Mid-Atlantic Petroleum Distributors Association](#)
1517 Ritchie Highway, Suite 206, Arnold, MD 21012
Phone: 410-349-0808 Fax: 410-349-8510
Can provide trends and locations where shortages are occurring.
- [American Petroleum Institute API](#)
1220 L Street, NW Washington, DC 20005-4070
Phone 202-682-8000
- Wawa, Inc.
260 West Baltimore Pike
Wawa, PA 19063
Brian Schaller, Senior Director

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Petroleum Supply & Trading
Office (610) 358-6884 Mobile (610) 368-6203
Rex Anderson, Director
Petroleum Logistics
Office (610) 558-8407 Mobile (610) 888-9461

- Delaware Petroleum Council
109 South State Street, Dover, DE 19901-7313
(302) 734-7455
- Delaware Department of Transportation ([DELDOT](#))
800 Bay Road, Dover, DE 19901
(302) 760-2000

[Traffic Counts](#) – DELDOT monitors traffic volume at various locations in Delaware. Specific locations could be expanded during a crisis.

[Retail Sales](#) – The Department of Agriculture, in coordination with DelDOT, monitors retail sales of Delaware gasoline stations on a monthly basis. This report may be prepared within 10 days after the close of each month.

[Total Sales](#) – The DELDOT Motor Fuel Tax Administration prepares reports on the monthly total sales of gasoline in the state. This report may be obtained within 60 days after the close of each month.

The DEO, working with MAPDA and other distributors (Wawa, etc.), will develop an ***Energy Emergency Supply Survey***. This web-based, voluntary survey will allow gas station operators to quickly and easily provide same-day data during declared Energy Emergencies, specifically including available stocks on hand, previous day sales volumes, and expected delivery schedule. DEO will use this information to better respond to consumer inquiries and provide emergency managers with current situational awareness.

5.5 DELAWARE GOVERNMENT ACTIONS

There are a number of voluntary and administrative actions that can be implemented by the state to meet the challenges of motor fuel shortages. Some non-mandatory measures will be the first actions taken during Phases I and II of an Energy Emergency.

Available measures include public information campaigns promoting conservation strategies; an executive order requiring the state vehicle fleet to reduce gasoline usage and directing DEO to assist counties and other local governments in plans to reduce consumption; a DEO-managed fuel set-aside and allocation program

Certain mandatory actions may require the Governor to issue an Emergency Declaration, or may only be introduced in a national crisis. Some voluntary measures (such as ridesharing and flexible work patterns) may be made mandatory under an Energy Emergency.

5.5.1 VOLUNTARY MEASURES

During the early phases of a petroleum shortage the Governor, through the Delaware Energy Office, may issue a request for voluntary reductions in petroleum consumption. Utilities also will sponsor media announcements addressing emergency energy demand reduction. The announcements suggest guidelines and energy saving tips, including such measures as:

1. Reduction of non-essential automobile use;
2. Increased ridesharing;
3. Increased use of public transit;
4. Increased use of bicycles;
5. Observance of speed limits; and
6. Flexible work patterns.

In the event of a petroleum disruption, the state's first response is to encourage voluntary reduction in petroleum demand. The specific voluntary demand reduction programs as being most effective are discussed below.

1. **Rideshare Program** – Delaware DA - Energy Response Team along with other state agencies may initiate an energy emergency rideshare program.
2. **Mass Transit** – Delaware DA - Energy Response Team, along with local government officials, will encourage greater use of mass transit facilities. Delaware DA – Energy Response Team will maintain regular contact with transit officials in the state to act as liaison in the collection and dissemination of ridership information.
3. **Bicycle Lanes** – Delaware DA - Energy Response Team will encourage commuters who live within bicycling distance of their places of employment to use their bicycles. For this program to be successful, local governments and employers may need to provide more bicycle racks or secured parking areas for employees.
4. **Changes in Work Patterns** – Delaware DA - Energy Response Team will encourage the use of flexible work hours for both short- and long-term demand reduction, improvement in fuel efficiency, and reduction in traffic congestion. Flexible hours can be instituted for ongoing cumulative transportation energy savings, or developed, held ready, and brought online quickly in the event of an energy shortage. This program allows

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

employees to stagger their commute hours, while still working during core hours, usually from 10:00 am to 2:00 p.m. This program reduces peak hour congestion, improving fuel efficiency.

5. **Initiatives for State Employees** – Delaware DA - Energy Response Team will direct state agencies to encourage employees to reduce commute trips by greater use of ridesharing, mass transit and flexible work schedules.

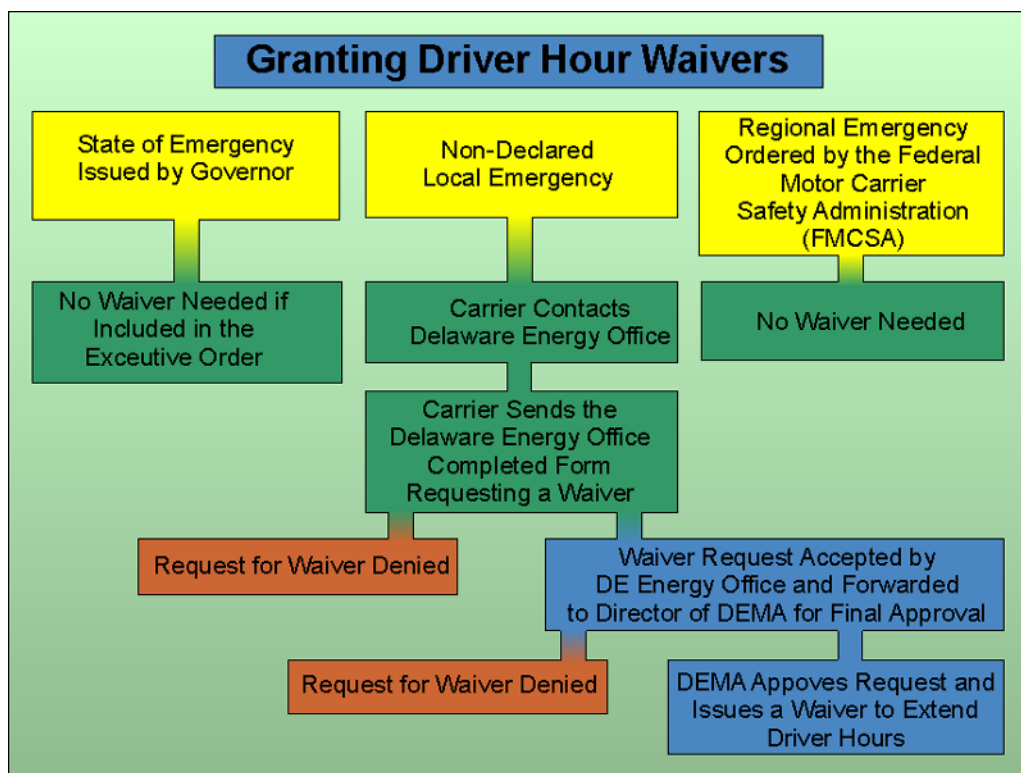
During previous petroleum fuel shortages appeals for conservation were effective and greater demand reduction was realized than anticipated.

5.5.2 FUEL DELIVERY REGULATION WAIVERS/SUSPENSIONS

1. **Motor Fuel Delivery Waivers** – Federal Department of Transportation Hours-of-Service regulations put limits in place for when and how long commercial motor vehicle (CMV) drivers may drive. Fuel drivers exceeding the daily driving limit would be required to pull to the side of the road and wait for a relief driver, delaying needed fuel deliveries.

The US DOT and the State of Delaware provides for a driver hour waiver under certain emergency conditions, including an emergency declaration by the governor. *If the Executive Order includes provisions waiving the Hours-of-Service requirements, no waiver is required.*

For non-declared local emergencies, use the Web-Based Driver Hours Waiver Program. This program is active today and ready to be used by Delaware regional trucking companies. Truck drivers seeking the waiver should be direct to go to the following web site: www.XXXXXXXXXXX@XXXXXXXXX.XXX



This system can be used for any critical supply item such as fuel, food, medicine, and other response supplies.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

2. ***Lifting of Fuel Load Limits*** – The US Department of Transportation and DELDOT restrict load limits on certain Delaware Highways; fuel trucks are normally restricted to a maximum of 7,800 gallons per delivery. In a declared emergency, the fuel load limit can be raised to 9,000 gallons per delivery. The procedure for implementing this suspension of the limits is **NEED LANGUAGE HERE**.

5.5.3 MANDATORY MEASURES

Mandatory measures may be implemented when the following events occur:

- The motor fuel shortage escalates,
- Voluntary conservation measures are not adequate,
- Essential services no longer is able to secure sufficient supplies of fuels through the open market, and
- The health, welfare and economy of the state may be in jeopardy.

Mandatory measures may be implemented after the governor proclaims a state of energy emergency. The list of mandatory programs that can be implemented includes:

- Gasoline queue management controls;
- Strictly enforced speed limits;
- Rideshare requirements for large employers;
- Flexible work patterns; and
- Encourage the use of alternative fuels.

Implementation of mandatory demand reduction programs must be evaluated to ensure that they do not exacerbate the motor fuel shortage. The benefits of these programs must be carefully weighed when considering if and when to implement them. Potential detrimental effects from implementing these programs could be:

- Initial action taken by the government may create public apprehension resulting in hoarding;
- Difficulty and cost of enforcement;
- Inequities which might be borne by consumers; and
- Financial loss to business and industry.

5.5.3.1 SET-ASIDE PROGRAM ELEMENTS

The State's Set-Aside Program is intended to ensure volumes of fuels are sufficient to satisfy hardship and emergency needs. To achieve maximum flexibility in the Set-Aside Program, individual program elements do not automatically become effective when the set-aside program is implemented. In addition, some parts of the program will be implemented only if the Federal government institutes price and allocation controls.

For a complete review of the Set-Aside Program, see Appendix B of the SEAP.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

The four Set-Aside Program elements are:

1. **Basic Set-Aside Element** – The program's Basic Set-Aside Element redistributes fuel supplies to bulk consumers who are considered priority users and who are experiencing difficulty obtaining sufficient fuel supplies at any price.
2. **Community Hardship Element** – The Community Hardship Element allows a community to request fuel supplies from the state set-aside when it is experiencing an emergency or hardship caused by a shortage of fuel, or is receiving less than 80 percent of the allocation fraction. Community Hardship is the only program element whereby retail service stations may be eligible for a set-aside allocation.
3. **Assignment and Adjustment Element** – The Assignment and Adjustment Element is intended for use only after the federal government institutes a price and allocation control program. Those bulk purchasing end users who do not have a record of fuel receipts for the base period may request that they be assigned a prime supplier. Those end users who have substantially increased their fuel use since the time of the base period, may apply for an adjustment of supply volume to increase the amount of their supplies.
4. **Certification Element** – The Certification Element allows emergency, health, safety and essential services to apply for Certification-Of-Need to receive their necessary supplies. The certification, once approved, will remain valid as long as this element of the program is operational.

Delaware Percentage of Products Set-Aside	
The monthly set-aside percentages applicable to prime suppliers and brokers for petroleum products subject to the set-aside program for Delaware:	
Gasoline.....	5 percent
Diesel.....	4 percent
Low Sulfur Diesel.....	4 Percent
High Sulfur Diesel (Red Dye).....	4 Percent
Kerosene.....	4 percent
#2 Fuel Oil (Heating Oil).....	4 percent
Aviation Gas.....	5 percent
Jet Fuel (kerosene base).....	5 percent
Jet Fuel (naphtha base).....	5 percent
Propane.....	3 percent
Figure 5.7	

5.5.3.2 FLEET GASOLINE USAGE REDUCTION ORDER

The governor may issue an executive order requiring a reduction in state fleet gasoline usage. DELDOT may be asked to prepare a fuel reduction contingency plan. It may include a survey of the current fleet and its uses, establishment of priority uses, development of alternatives for those curtailed activities, and determination of method of transport of gasoline supplies to fleets around the state.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

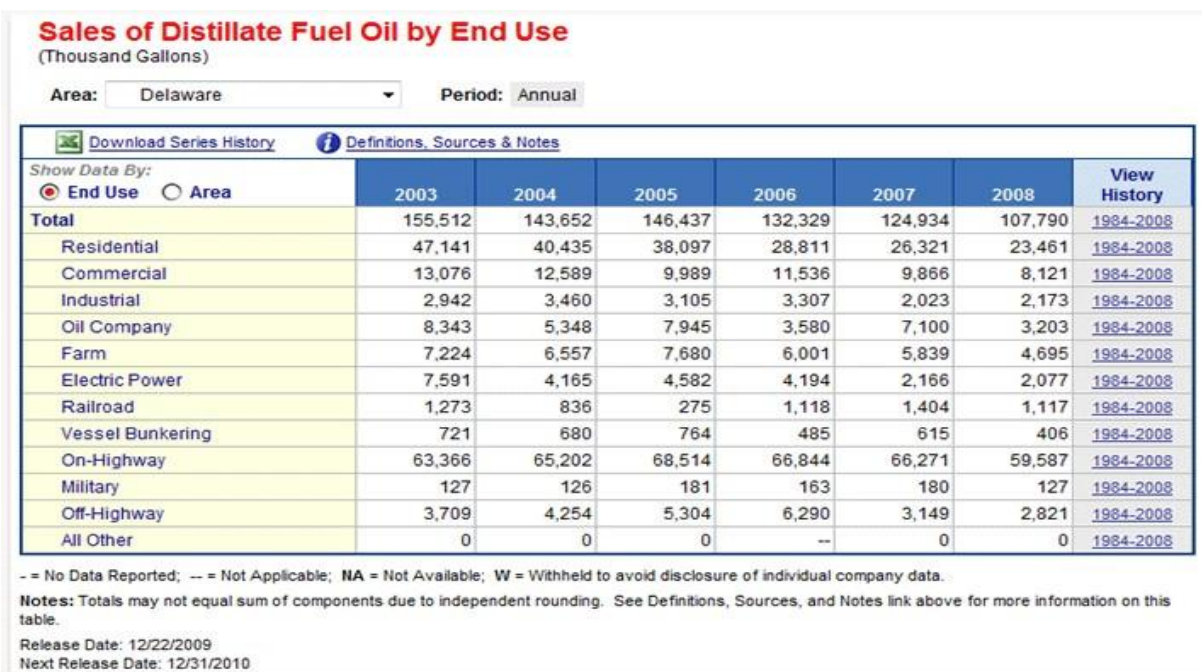


Figure 5.6 - Source: http://www.eia.doe.gov/dnav/pet/pet_cons_821dst_dcu_SDE_a.htm

5.6 LOCAL/COUNTY GOVERNMENT ACTIONS

The Delaware Energy Office (Delaware Energy Response Team) staff may assist local governments in designing programs to reduce gasoline consumption in their fleets. Specifically, the Delaware Energy Response Team may design generic conservation programs for fleets of various sizes incorporating the concepts of fleet management and routing/scheduling techniques. Delaware DA - Energy Response Team staff may also assist local governments in performing vehicle use studies with priority use established, fuel management plans, and alternatives developed for non-priority use. Local government is in the best position to know how the gasoline shortage is affecting the area, it is essential to include representatives in the implementation plan. Discussions with local government representatives will help to determine the best mechanism for this involvement.

Specific issues of interest to local governments include:

1. Ability of locals to enforce any mandatory measures in light of manpower and funding limitations.

2. Role of local governments in providing timely public information on supply situation.

Fuel Contingency Measures by Type
Distribution and Supply Management
<ul style="list-style-type: none"> • Minimum purchase program • Odd/even day purchase program • Limited hours of operation by motor fuel Retailers • Geographic distribution plans by primary Suppliers
Demand Reduction
<ul style="list-style-type: none"> • Stricter enforcement of speed limits • Carpool/vanpool, mass transit promotion • Flexible work hours
No-Drive Day
<ul style="list-style-type: none"> • Parking facility limitations • One-day closure of retail stores • Fuel tax
Figure 5.8

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

3. Provision of information on location and availability of gasoline, including a statewide hotline.
4. Maintenance of essential and priority uses for health, safety, fire, and mass transit.

5.7 DELAWARE'S EMERGENCY FUEL ALLOCATION PROGRAM (SET-ASIDE)

The purpose of Delaware's Emergency Fuel Allocation Program helps to mitigate shortages and hardships for priority users who are unable to acquire sufficient fuel at any price. This program will be implemented only after the governor proclaims a state of emergency and when market forces, voluntary conservation or other mandatory programs are unable to provide for adequate and equitable distribution of fuel.

After proclaiming an energy emergency, the governor may direct the Delaware Energy Office to operate a set-aside and allocation program for some/ or-all motor fuels to provide for the preservation of the public health, safety and welfare. This program is managed with an on-line Web-Based system or paper forms and telephones. A description of this plan is covered in [Appendix C](#) of this plan.

The state's petroleum fuels set-aside program is designed to allow the open market handle petroleum emergencies without governmental intervention unless absolutely necessary. The program uses set-aside volumes that are sufficient only to satisfy hardship and emergency cases. The set-aside program makes no attempt to control the market price of fuels. All fuels delivered through the program will be purchased at the market price. The plan establishes two broad types of demand reduction measures for a petroleum shortage emergency. The first response is a public appeal for voluntary fuel conservation. The second response, in the event the shortage worsens and the governor proclaims a state of emergency, is a series of mandatory measures to reduce petroleum consumption.

Delaware Critical Service Providers Priority List (not in order)
Agricultural production, including agricultural trucking and agricultural aviation
Aviation ground support vehicles and equipment
Cargo, freight and mail hauling by truck, including diesel truck stations
Emergency services and public works
Energy production
Health care facilities
New businesses that might not have established base year volume history
Public passenger transportation services
Sanitation services
Snow removal and other non-normative road service
Telecommunication services
Utility services
Figure 5.9

5.8 PUBLIC INFORMATION PROGRAM FOR MOTOR FUEL SHORTAGE

This program seeks public support and acceptance of any emergency fuel allocation or conservation strategies, and to assure understanding of the requirements of any implemented strategy. Information dissemination will be traditional and include: news releases, daily response to media inquiries, fact sheets, and other publications on fuel-saving ideas.

1. How to comply with conservation strategies.
2. Additional energy saving measures, other than those implemented in an emergency.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

3. Regular updates on fuel supplies, spot shortage areas, and effectiveness of conservation efforts.

The dissemination of information concerning the motor fuels shortage includes:

1. The Delaware Energy Office may provide speakers to organizations.
2. Films and other educational materials provided to organizations.
3. Coordination with the state's major employers to develop educational and incentive programs for their employees.
4. A Public Service Campaign (PSA) (limited by budget) which will include TV Spots, Radio Spots, and PSA scripts, for all radio stations, issued regularly by the Delaware Energy Office, giving both updates and information

Discussions with representatives of the media may be conducted to enlist their cooperation in dealing with any emergency situation that might arise. The media plays a critical role in any emergency situation. It is through the media that the public learns about the situation --- its actual seriousness, as well as how to respond. It is essential that information given the public in an emergency be accurate.

The first set of actions to be implemented is a public appeal for voluntary conservation of

petroleum, natural gas, and electricity. The second set of actions, in the event the shortage worsens and the governor proclaims a state of emergency, calls for a series of mandatory measures to regulate petroleum consumption.

Public information is a vital component during all phases of an energy emergency. Specific public information measures and actions are discussed for each specific phase in Sections 5.11 – 5.13, below.

5.9 GOVERNOR'S MOTOR FUEL ADVISORY GROUP

The Emergency Motor Fuel Advisory Group (EMAG), representing various agencies involved in the economic assistance programs, convenes in the event of an energy supply disruption. The EMAG coordinates and oversees the distribution of both state and federal funds during a motor fuel supply disruption. In the event of an emergency, the EMAG determine the lead agency and support agency roles, adjusting the details of the operation process to the specific nature of the supply shortage. When a fuel emergency is a matter of statewide concern the Governor may institute an executive order for the EMAG. The duties and responsibilities of the council are:

1. Identify those rules and regulations which assists the efficient utilization of fuel within the state and recommend the administrative and legislative options necessary to respond to a petroleum product shortage. This could include emergency powers legislation, executive orders, rules, proclamations, and regulations.
2. Define programs to manage supply and reduce fuel usage where appropriate and review and recommend programs to promote conservation, prevention of waste, recycling and salvage of fuel supplies and resources by the public and private sectors.
3. Review those existing standards and requirements which may need to be suspended or modified and which affect or are affected by the use of fuel, including those relating to air

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

quality control, the type and composition of various fuels, the production and distribution of energy resources, and the hours and days during which public buildings and commercial and industrial establishments may be or are required to remain open.

5.10 MOTOR FUEL EMERGENCY CONTACTS

American Automobile Association

1000 AAA Drive
Heathrow, FL 32746
(407) 444-7000 Fax: (407) 444-7614

Delaware Petroleum Council

Gary Paterson, Executive Director
109 South State Street
Dover, DE 19901-7317
(302) 734-7455

National Petroleum Council

1625 K Street, NW Ste 600
Washington, D.C. 20006
(202) 393-6100/Fax: (202) 331-8539
www.npc.org

Mid-Atlantic Petroleum Distributors Association

Contact: Peter Horrigan
1517 Ritchie Highway, Suite 206,
Arnold, MD 21012
Phone: 410-349-0808 Fax: 410-349-8510
E-mail: petegwyn@aol.com

Association of Oil Pipe Lines

1101 Vermont Avenue, N.W., Ste. 604
Washington, D.C. 20005
(202) 408-7970 Fax: (202) 408-7983

National Petroleum & Refiners Association

1899 L Street, NW Ste 1000
Washington, D.C. 20036
(202) 457-0480/Fax: (202) 457-0486 www.npradc.org

Petroleum Transportation & Storage Assoc. (PTSA)

Mark S. Morgan, ESQ
4200 Wisconsin Ave NW, Suite 106

Washington, DC 20016
Office: (202) 364-6767 FAX: (202) 966-4560 ptsa@erols.com

Petroleum Marketers Assoc. of America (PMAA)

Dan Gilligan, CAE
1901 N Fort Myer Drive, Suite 1200
Arlington, VA 22209-1604
Phone:(703) 351-8000 Fax:(703) 351-9160
dgilligan@pmaa.org

Delaware Energy Office

146 South Governors Ave.,
Dover, DE 19904
(302) 739-1530
<http://www.delaware-energy.com>

Delaware Emergency Management Agency (DEMA)

165 Brick Store Landing Road
Smyrna, DE 19977
302-659-DEMA (3362) or 1-877-SAY
DEMA
FAX 302-659-6853
<http://www.state.de.us/DEMA/>

**Delaware Department of Agriculture
Weights and Measures Division
(Gasoline Station Fuel Measurements)**

Administrator, Steve Connors

(302) 698-4601

2320 South DuPont Highway

Dover, DE 19901

<http://www.state.de.us/deptagri>

5.11 Phase I - Monitor and Alert Activities - Motor Fuel Shortage

Phase I - Monitor and Alert - Involves the normal ongoing energy supply, demand and price monitoring. State agencies regularly monitor data and information as it becomes available through energy supply reporting systems ([see Appendix F on Monitoring Fuel Supplies](#)) and pay special attention to supply and distribution problems. Phase I is activated when supply problems of motor fuel (gasoline and diesel), are reported by reliable sources such as the fuel retailers and the terminal.

Phase I - Response Activity - Actions to Take	Lead Agency	Support Agency
Continue normal operations and ramp-up the frequency of monitoring motor fuel prices and supplies.	Delaware DA - Energy Response Team	Staff
Update emergency contact lists. Contact representatives of motor fuel suppliers and distributors to assess the causes, probable duration, and geographic extent of the shortage and the steps providers can take to alleviate or avert a shortage (convene meetings if necessary).	Delaware DA - Energy Response Team	Delaware DA - Energy Response Team State Agencies
The Delaware DA - Energy Response Team develops lists of trucking companies that employ fleets of diesel trucks and construction companies that utilize large numbers of diesel powered units. These lists will be used if the situation escalates and the Governor requests the companies to voluntarily reduce operations.	Delaware DA - Energy Response Team	Fleets
Prepare to issue public appeals for voluntary conservation through the Governor's Press Secretary for motor fuels in case situation escalates to Pre-Emergency Phase II.	Delaware DA - Energy Response Team	Staff
During a shortage of diesel fuel, the Governor may request trucking companies to voluntarily reduce operations in order to conserve fuel. Employers will be encouraged to allow employees to use accumulated vacation time.	GOV	DEMA State Agencies
Delaware DA - Energy Response Team will review procedures with appropriate agencies for reduction of the 65 MPH speed limit to 55 MPH and increased enforcement of the 55 MPH speed limit for all diesel powered vehicles.	GOV	DEMA State Agencies
Delaware DA - Energy Response Team reviews procedures with appropriate agencies for the suspension of truck weight and size regulations in order to conserve diesel motor fuel. Delaware DA - Energy Response Team reviews public information announcements concerning possible suspension of truck weight and size regulations.	GOV	DEMA State Agencies
Implement state government vehicle motor fuel conservation program.	Delaware DA - Energy Response Team	DEMA State Agencies
Governor may request aid of USDOE and congressional delegation to secure additional supplies of motor fuel.	GOV Delaware DA - Energy Response Team	USDOE Cong. Del.
If motor fuel shortage increases, Delaware DA - Energy Response Team will recommend to the Governor that the state escalate to Pre-Emergency Phase II. Delaware DA - Energy Response Team will notify all in-state and out-of-state agencies and companies of the escalation.	GOV	Delaware Energy Response Team
If motor fuel shortage is forecast to diminish and start to return to normal, Delaware DA - Energy Response Team will recommend to the Governor a de-escalation back to normal day-to-day activity. Notify all in-state and out-of-state agencies and companies of the	GOV	Delaware DA - Energy Response Team

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

de-escalation.		
Phase I - Motor Fuel Shortage Public Information Program		
The DEMA Joint Information Center (JIC) will provide information to newspapers and radio and television stations on how consumers can conserve motor fuel. The public will be informed as to what it can do to voluntarily conserve motor fuel (see information that follows in this chapter).	JIC DEMA PIO	Delaware DA - Energy Response Team Staff
The Joint Information Center (JIC) will implement motor fuel public information program and issue public appeals for voluntary conservation.	JIC	Delaware DA - Energy Response Team DEMA Staff
The Joint Information Center (JIC) team will establish a central media center and press briefings at scheduled times to facilitate news flow to the media.	JIC	Delaware DA - Energy Response Team DEMA Staff
5.12 Phase II - Assess and Determine Action - Motor Fuel Supply Shortage		
<p>Phase II - Assess and Determine Action - In Phase II, having noticed early signs of what might become an energy emergency, responding agencies intensify data and information collection efforts and ensure that the most recent information is available. This information is analyzed to evaluate potential outcomes and assess possible courses of action. Phase II is activated when motor fuel (gasoline and diesel) shortages increase and increased monitoring and conclusions reached by industry representatives and others directly involved indicate an impending motor fuels shortage.</p> <ul style="list-style-type: none"> • Appropriate contacts throughout state government should be informed of the results of this assessment. • Appropriate action can then be determined. If no action is required, monitoring and evaluation continue and further updates are made as changes occur. 		
The Governor may request trucking and construction companies to reduce operations.	GOV Delaware DA - Energy Response Team	DEMA State Agencies
Delaware DA - Energy Response Team will review procedures with appropriate agencies for reduction of the 65 MPH speed limit to 55 MPH and increased enforcement of the 55 MPH speed limit for all diesel powered vehicles.	Energy Response Team	DEMA State Agencies
Delaware DA - Energy Response Team will request the DEMA and the Joint Information Center (JIC) to implement public information program and issue public directives for mandatory conservation (see this chapter for motor fuel conservation measures and formatted natural gas media announcements).	DEMA JIC	DEMA State Agencies
Delaware DA - Energy Response Team, together with other state agencies and industry, will determine rules and regulations that will be required to implement a mandatory ban on the use of certain diesel-powered vehicles if the situation escalates to Emergency Phase III.	Energy Response Team	DEMA State Agencies
Arrange with adjacent states to facilitate fuel transport by truck. Request suspension of USDOT Drivers Hours of Service Restrictions. Request deferral of USDOT Vehicle Inspection Requirements.	Energy Response Team USDOT	Fuel Transport Dealers
Exempt fuel transports from 55 mph restrictions.	GOV Delaware DA - Energy Response Team	DEMA State Agencies
Direct fuel distributors to decline to accept new customers to discourage hoarding.	DEMA JIC	Fuel Transport Dealers
If the motor fuel shortage is forecast to diminish and start to return to normal, recommend to the Governor a de-escalation to Verification Phase I. Notify all in-state and out-of-state agencies and companies of the de-	GOV Energy Response Team	DEMA State Agencies

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

escalation.		
If the motor fuel shortage is forecast to worsen, recommend to the Governor an escalation to Emergency Phase III. Notify all in-state and out-of state agencies and companies of the escalation.	GOV Energy Response Team	DEMA State Agencies
Phase II - Motor Fuel Shortage Public Information Program		
Energy Response Team monitors DOE-EIA Monthly Fuel Outlook which discusses fuel supply and demand in the upcoming month. Press releases are issued when appropriate.	DEMA JIC	Delaware DA - Energy Response Team
Promote Carpooling/Vanpooling/Mass Transit. This is an ongoing function of Energy Response Team and the Highway Department. Energy Response Team staff develops and disseminates materials on gasoline conservation.	DEMA JIC	Delaware DA - Energy Response Team
Inform media and public when supply conditions return to normal, and Governor rescinds the rule reducing speed limit from 65 to 55 MPH.	DEMA JIC	Delaware DA - Energy Response Team
The JIC staff at the EOC must inform the public and provide the ability for the system to go from mandatory measures to voluntary measures to normal conduct of business Energy Response Team will review public information announcements concerning speed limit reduction and enforcement.	DEMA JIC	Delaware DA - Energy Response Team
5.13 Phase III - Actions and Feedback - Motor Fuel Supply Shortage		
<p>Phase III - Actions and Feedback - Once a decision has been made that specific state government action is necessary to assure the health, welfare, and safety of citizens, and the continued economic well-being of the state, Phase III activity begins. This includes:</p> <ul style="list-style-type: none"> Implementing programs to maximize available supplies and/or to minimize existing demand levels and monitoring these activities to determine their effectiveness; Increasing the level of communication among state agencies and others; If the nature of the problem involves multiple states, information sharing among state energy coordinators, using the EEAC website, should begin; (the password-protected Energy Emergency Assurance Coordinators (EEAC) website through which authorized state energy emergency coordinators may access valuable energy security information, including daily news summaries, emergency situation reports, lessons learned from other states, links to outage and curtailment information, and the ability to email messages to colleagues in other jurisdictions). more info Convening emergency planning and response organizations to consider actions that might be taken by the various state departments and agencies; If implementation of voluntary programs or other emergency deterrent actions fail to mitigate the emergency, begin implementing additional actions; If the situation continues to deteriorate, recommending that a "State of Energy Emergency" be declared (usually by the Governor). The Governor may also be called upon to declare a "State of Disaster." State legislation regarding "State of Energy Emergency" and/or "State of Disaster" will dictate further action and assign responsibility among pertinent parties; and If it appears that all other options available to the state prove inadequate, the next level of mobilization is to request federal assistance. 		

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Federal assistance would generally be available in the case of a national/international energy emergency. The emergency planning agencies and representatives from other state departments, as appropriate, would be responsible for coordinating and monitoring federal programs; Federal assistance may be requested sooner without a declaration of a national emergency to provide the following;

- Waiver federal driver hour requirements [more info](#);
- Waiver vehicle [fuel air quality standards](#);
- Request Coast Guard to intensify ice breaking (if Delaware River is frozen hampering barge movement; and Request [Strategic Petroleum Reserve \(SPR\)](#) or the [Northeast Heating Oil Reserves](#).

Phase III - Motor Fuel Shortage Response Activity - Actions to Take	Lead Agency	Support Agency
Delaware DA - Energy Response Team will continue the intensified level of monitoring and maintenance of contacts with suppliers, distributors, and users until conditions have returned to normal. Increase Delaware DA - Energy Response Team hours of operations and shift schedules to address current situation. Delaware DA - Energy Response Team monitors motor fuel supply and demand Information from DOE-EIA Monthly Fuel Outlook, which discusses fuel supply and demand in the upcoming month.	Delaware DA - Energy Response Team	DEMA State Agencies
Delaware DA - Energy Response Team will assist the public information team at the Joint Information Center (JIC) in continuing the public information program and appeals for mandatory conservation measures, as necessary, or until conditions have returned to normal.	Delaware DA Energy Response Team DEMA JIC	DEMA State Agencies
Prepare necessary mandatory rules and regulations to cope with the emergency shortage of motor fuel for the Governor. Delaware DA - Energy Response Team may recommend that the Delaware Motor Fuel Set-Aside Program to be implemented by the Governor	Delaware DA Energy Response Team GO	DEMA State Agencies
The Governor, utilizing emergency powers, may implement the rules and regulations concerning the banning of certain diesel powered vehicles and issue rules reducing speed limit from 65 MPH to 55 MPH and issues orders for strict enforcement of the 55 MPH speed limit for diesel powered vehicles.	GOV Delaware DA Energy Response Team	Delaware DA - Energy Response Team DEMA
Recommend to the Governor the limits for the use of vehicles by businesses and local governments, including schools. Also, recommend the use of vehicles by state government agencies.	GOV Del DA Energy Response Team	DEMA State Agencies
Governor may issue rules suspending truck weight and size regulations and orders for enforcement of truck weight and size regulations as revised by suspension.	GOV	Delaware DA - Energy Response Team
Implement public information program and issue public directives for mandatory fuel conservation. See list of transportation fuel consumption options in the chapter for an outline of motor fuel conservation measures.	Delaware DA Energy Response Team DEMA JIC	DEMA
As motor fuel supply improves and product becomes available, Delaware DA - Energy Response Team will advise the Governor on the removal of the mandatory ban on diesel powered vehicles; continuation of voluntary reduction in use of diesel powered vehicles; and eventual return to normal conditions. The Governor may rescind rules suspending truck weight and	GOV	Delaware DA - Energy Response Team

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

size limits and return truck weight and size regulations to those that existed previously.		
Inform all in-state and out-of state agencies and companies when Emergency Phase III is terminated and the state has returned to normal and release of the mandatory conservation measures for motor fuel.	Delaware DA - Energy Response Team	DEMA
Phase III - Motor Fuel Shortage Public Information Program		
Continue public information program and appeals for mandatory fuel conservation measures, as necessary, or until conditions have returned to normal.	Delaware DA - Energy Response Team DEMA JIC	Media Delaware DA - Energy Response Team Staff
The JIC will inform the public through the media. When appropriate, the director of Delaware DA - Energy Response Team may inform the public through the media.	Delaware DA - Energy Response Team DEMA JIC	Media Delaware DA - Energy Response Team Staff
Delaware DA - Energy Response Team and the JIC will ensure the media is apprised of the fuel situation and given specific voluntary conservation measures to implement. In order for the public to cooperate in conservation measures, it must be fully informed on the gravity of the situation and must be given specific instructions on the conservation measures it is requested to implement.	Delaware DA - Energy Response Team DEMA JIC	Media Delaware DA - Energy Response Team Staff
Implement public information program and issue public appeals for mandatory conservation. Develop media release procedures. Establish a central media center and press briefings at scheduled times to facilitate news flow to the media.	Delaware DA - Energy Response Team DEMA JIC	Media Delaware DA - Energy Response Team Staff
The public is carefully informed of the motor fuel shortage and that the state is in Pre-Emergency Phase II. Public information announcements must be extremely conscious of not being alarming in tone. They should be informative, but not cause panic buying of products and hoarding.	Delaware DA - Energy Response Team DEMA JIC	Media Delaware DA - Energy Response Team Staff
5.14 Phase IV - Review Lessons Learned - Motor Fuel Shortage		
<p>Phase IV - Review Lessons Learned - In Phase IV, As emergency operations are phased out, responding state agencies should evaluate the emergency preparedness programs and activities that were implemented and report the results to interested parties such as the Governor's Office, cabinet level officers, legislative committees and energy policy councils. Evaluation activities should include:</p> <ul style="list-style-type: none"> • Reports describing the nature of the energy emergency and a chronology of the actions taken to respond to it; • Evaluation of mitigation actions results and of the effectiveness of specific actions taken to respond to the emergency; and • Critical reviews of the overall performance of the state's energy emergency plans in addressing an emergency. It should be noted that movement from one phase to another is as much a matter of judgment as it is a matter of objective definition. 		

6A.1 STATE OF DELAWARE ELECTRICITY-SMART-GRID-TECHNOLOGY¹



[Delaware Updated Quick Energy Facts Click Here!](#)

Note: In preparing this Chapter 6A -on Smart Grid Technology, we have noted that many documents have been written to support the technology. Several cities in the U.S. are either in the planning stage or are implementing the process. The paragraphs below were taken from the [Smart Grid: An Introduction](#). Many research documents have been written and we have captured the hyper-links to the relevant documents.

Robert Kistner, President and CEO Energy Planning Consultants, Inc

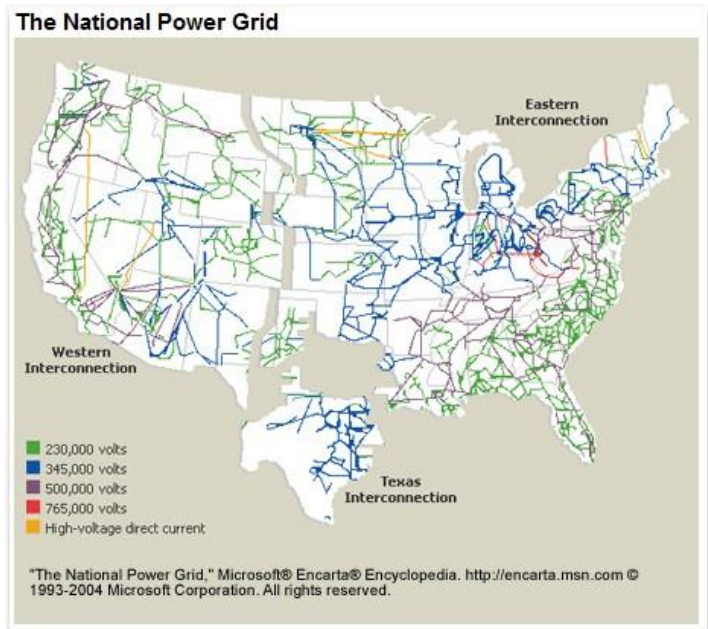
While much of the technical and policy discussion about how to ensure a sustainable energy future focuses on energy efficiency, renewable energy sources, storage, and plug-in electric cars, it is often forgotten or underemphasized that these solutions all depend on a smarter grid to achieve scale and cost effectiveness. A Smart Grid is therefore foundational for a sustainable energy future; and if there is a growing consensus within the United States that clean energy is a platform for rebuilding the American economy, then it follows that the realization of a Smart Grid is also critical to economic growth. There are numerous pressures on the electric power delivery system are converging, forcing the system to evolve. These pressures include:

- Rising costs of capital, raw materials, and labor
- Aging infrastructure and workforce
- Continuing national security concerns
- Need for and viability of energy efficiency caused by the expansion of the global economy
- Rising energy costs with viable options
- Increasing awareness of environmental issues, including global warming
- Regulatory pressures
- Social pressures
- Calls for energy efficiency
- Growing demand for energy
- Rising consumer expectations
- Rapid innovations in technology



¹ Sources: Internet, DOE, and Smart Grid Other Sources

A Smart Grid is capable of addressing these challenges. There are many working definitions of a Smart Grid and many examples of initiatives under way that could be considered Smart Grid projects. However, for the purposes of this report, a Smart Grid is defined as a broad range of solutions that optimize the energy value chain. To provide examples, this report highlights [four utilities](#) deploying various Smart Grid projects that are approved and funded by the relevant regulatory body. Studies have shown that the potential economic and environmental payoffs of transforming the current electric power delivery system into a Smart Grid are numerous. From an economic perspective, a Smart Grid can enable reduced overall energy consumption through consumer education and participation in energy efficiency and demand response / load management programs. Shifting electricity usage to less expensive off-peak hours can allow for better utilization of equipment and better use of capacity. From an environmental standpoint, a Smart Grid can reduce carbon emissions by maximizing demand response/load management, minimizing use of peak generation, and replacing traditional forms of generation with renewable sources of generation. A Smart Grid also holds the promise of enhanced reliability and security of the nation's power system. Fundamentally, the challenges faced by the energy sector emanate from transitioning an existing and operational energy model toward a Smart Grid. These challenges include increasing customer awareness and participation, allocating costs appropriately and fairly among stakeholders, developing and executing business case models, identifying and implementing best practices and standards throughout the industry, and establishing a coordinated strategy that capitalizes on using smarter technology to evolve to a Smart Grid.



- Though there has been much debate over the exact definition, a Smart Grid actually comprises a broad range of technology solutions that optimize the energy value chain. Depending on where and how a specific utility operates across that chain, it can benefit from deploying certain parts of a Smart Grid solution set. The [Electricity Advisory Committee \(EAC\)](#) is referencing two U.S. Department of Energy (DOE) publications to better illustrate a Smart Grid. [The Smart Grid: An Introduction explains that a Smart Grid](#) uses "digital technology to improve reliability, security, and efficiency of the electric system: from large generation, through the delivery systems to electricity consumers and a growing number of distributed-generation and storage resources. According to the [Galvin Electricity Initiative](#) and the Electric Power Research Institute (EPRI), the economic and environmental benefits of transforming the current electric power

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2010

delivery system into a Smart Grid are numerous. The [EPRI Electricity Sector Framework for the Future](#) estimates \$1.8 trillion in annual additive revenue by 2020 with a substantially more efficient and reliable grid. Smart Grid technologies would reduce power disturbance costs to the U.S. economy by \$49 billion per year. Smart Grids would also reduce the need for massive infrastructure investments by between \$46 billion and \$117 billion over the next 20 years. "Widespread deployment of technology that allows consumers to easily control their power consumption could add \$5 billion to \$7 billion per year back into the U.S. economy by 2015, and \$15 billion to \$20 billion per year by 2020." Widespread deployment of technology that allows consumers to easily control their power consumption could add \$5 billion to \$7 billion per year back into the U.S. economy by 2015, and \$15 billion to \$20 billion per year by 2020.

Table 2-3. Smart Grid Benefits Matrix

Potential and Real Benefits to be Realized by Building and Implementing a Smart Grid						
Benefit	Stakeholder					
	Utility	Independent Generator	Residential	Commercial	Industrial	Future Generations
System Reliability and Economics						
Smart Grid technologies allow faster diagnosis of distribution outages and automated restoration of undamaged portions of the grid, reducing overall outage times with major economic benefits.	x		x	x	x	
Smart Grid's automated diagnostic and self-healing capability prolongs the life of the electric infrastructure.	x					x
Distributed generation is supported because the grid has the ability to dynamically manage all sources of power on the grid.	x	x	x	x	x	x
Price-sensitive peak shaving defers the need for grid expansion and retrofit.	x					
Price-sensitive peak shaving reduces the need for peaking generation capacity investments.	x		x	x	x	
Smart Grid technologies may allow better utilization of transmission paths, improving long distance energy transfers.	x	x				
Positive Environmental Impact						
Smart Grid can reduce distribution losses, thus reducing power generation demands.	x		x	x	x	x
Grid integration of high levels of renewable resources as called for in many state RPS standards will require Smart Grid to manage extensive distributed generation and storage resources.	x	x	x	x	x	x
A high penetration of PHEV will require Smart Grid to manage grid support of vehicle charging. Potential use of PHEV as Vehicle to Grid will absolutely require Smart Grid technologies.	x		x			x
A Smart Grid enables intelligent appliances to provide feedback through the system, sense grid stress, and reduce their power use during peak demand periods.	x		x			
Advanced metering technology can be used to help measure electricity use and calculate the resulting carbon footprint.			x	x	x	x
Increased efficiency of power delivery						
Direct operating costs are reduced through the use of advanced metering technology (AMR/AMI) such as connects/disconnects, vehicle fleet operations and maintenance, meter reads, employee insurance compensation insurance, etc.	x					
Smart Grid technologies, such as synchrophasors, offer the promise of reducing transmission congestion.	x	x	x	x	x	
Economic Development						
Standards and protocols supporting interoperability will promote product innovation and business opportunities that support the Smart Grid concept.	x	x	x	x	x	x
Consumer Choice						
Provide consumers with information on their electric usage so they can make smart energy choices.			x	x	x	x
Real-time pricing offers consumers a "choice" of cost and convenience trade-offs that are superior to hierarchical demand management programs.			x	x	x	
Integration of building automation systems offers efficiency gains, grid expansion deferral, and peak shaving.	x			x		

Source: Table created for *Smart Grid: Enabler of the New Energy Economy* by EAC Smart Grid Subcommittee 2008

- If efforts are underway to implement the **Smart Grid** it will mean a substantial increase in the amount of cyber-based communications within the Power Grid. It will be important that various standards under development are properly implemented and maintained as an integral component of an overall cyber security effort. The cyber security strategy for the Smart Grid must examine both domain-specific and common requirements when developing a mitigation strategy to ensure interoperability of solutions across different parts of the infrastructure. The primary

goal is to ensure that a comprehensive evaluation of the systems and components of the Smart Grid is completed.

6A.2 REDUCED OPERATIONS AND MAINTENANCE COSTS

Smart Grid technologies allow for remote and automated disconnections and reconnections, which eliminate unneeded field trips, reduce consumer outage and high-bill calls, and ultimately reduce operations and maintenance (O&M) costs. Reduced costs can also result from near real-time remote asset monitoring, enabling utilities to move from time-based maintenance practices to equipment-condition-based maintenance. Using enhanced information about grid assets from Smart Grid monitoring technologies, grid operators can reduce the risk of overloading problematic equipment—especially transmission power transformers. These multi-million dollar assets have an expected life of 40 years, but a significant percent of the U.S. power transformer fleet is approaching or already past this age. Simply keeping the transformers in service risks increased failure rates and even greater outage costs, as well as larger disruptions or more severe damage to system equipment. However, doing so is often a necessity, as the cost of replacing transformers has increased rapidly, along with the prices for copper and ferromagnetic steel. Today, multi-function sensors are available that can continuously monitor a number of physical parameters for signs of incipient failure (e.g., insulation breakdown, loosening of fasteners that hold windings in place). Information from these devices, together with sophisticated analysis of fault conditions from power circuit breakers that protect the transformers, can help determine when the equipment needs maintenance, repairs, and eventually replacement.

6A.3 INCREASED EFFICIENCY OF POWER DELIVERY

Up to a 30% reduction in distribution losses is possible from optimal power factor performance and system balancing. Today, this problem is managed to some extent by controlled or automated capacitor banks on distribution circuits and in substations. Control of these devices can be greatly improved with better real-time information. Almost all higher efficiency appliances, heating, ventilation, and cooling (HVAC) systems, consumer electronics, lighting, and other load devices are changing from being -resistivell (e.g., incandescent light bulbs) or -rotatingll (as in motors) to -inverter basedll. The transition of load from -resistivell to -inverter basedll means that the overall system performance, especially with respect to power factor and reactive power needs, changes dramatically over time. Smart Grid technologies offer utilities increased monitoring of rapid power changes and help them adapt control schemes and deploy capacitors and other power-factor control devices—including power electronics-based devices in substations—to compensate.

6A.5 INTEGRATION OF RENEWABLE ENERGY AND DISTRIBUTED RESOURCES

Smart Grid technologies will allow the grid to better adapt to the dynamics of renewable energy and distributed generation, helping utilities and consumers more easily access these

resources and reap the benefits. Today's grid was designed to move power from centralized supply sources to fixed, predictable loads; this makes it challenging for the grid to accept input from many distributed energy resources across the grid. And because resources such as solar and wind power are intermittent, the grid will require integrated monitoring and control, as well as integration with substation automation, to control differing energy flows and plan for standby capacity to supplement intermittent generation. Smart Grid capabilities will make it easier to control bi-directional power flows and monitor, control, and support these distributed resources.

6A.6 IMPROVED SYSTEM SECURITY

Utilities are increasingly employing digital devices in substations to improve protection, enable substation automation, and increase reliability and control. However, these remotely accessible and programmable devices can introduce cyber security concerns. While the [North American Electric Reliability Corporation](#) (NERC) has developed Critical Infrastructure Protection standards to address these issues, Smart Grid technology and capabilities will offer better integration of these devices, increased use of sensors, and added layers of control. Smart Grid technologies, however, can bring their own cyber security concerns, which will require comprehensive, built-in security during implementation. Smart Grid technologies can do the following:

- Bring higher levels of investment and greater penetration of information technology (IT) into the grid, allowing utilities to address cyber security issues more effectively.
- Increase the robustness of the grid to withstand component failures, whether due to natural events, age/condition of assets, or hostile causes.
- Allow grid components and IT systems in time to detect intrusion attempts and provide real-time notification to cyber security organizations.

6A.7 BENEFITS TO CONSUMERS

A 2007 survey conducted by IBM of 1,900 energy consumers revealed that growing reliability concerns, fears over environmental sustainability, and increasing costs of energy bills have created a demand from consumers for more control over their energy consumption decisions. As Smart Grid projects enable a more participatory network comprising intelligent network-connected devices, distributed generation, and energy management tools, consumers will be able to better plan and manage their energy consumption. Additional benefits are outlined below.

6A.8 CONSUMPTION MANAGEMENT

Smart Grid technologies offer consumers the knowledge and ability to manage their own consumption habits through in-home or building automation. Advanced meters tell consumers how energy is used within their home or business, what that usage costs them, and what kind of impact that usage has on the environment. They can manage their usage interactively or set

preferences that tell the utility to automatically make adjustments based on those choices. Consumers can create home area networks (HANs) of smart appliances, thermostats, security systems, and electronics that are able to communicate with the grid and relay information back to the consumer. Consumers will further be able to remotely manage these appliances. Two-way communications facilities will even allow appliances and security systems to initiate the conversation, notifying home and business owners of problems or safety alerts when they are away. These Smart Homes and Smart Buildings are convenient, efficient, and can encourage consumers to make energy-efficient decisions that result in energy savings.

6A.9 COST SAVINGS FROM PEAK LOAD REDUCTION

The electric power industry has long known that demand response/load management programs aimed at reducing peak load can have economic benefits for the utility and the consumer. As noted in the Electricity Advisory Committee's report, [*Keeping the Lights On in the New World*](#), some peaking combustion turbines only run a few hours a year when load is at its highest, which in a market environment can mean that energy costs \$1000 per megawatt hour (MWh) to generate. In a regulated environment, the system average costs still have to cover the annualized cost for those units, even if it does not show up as a very high spot price. Consumers that defer peak energy usage to a later hour or otherwise reduce peak consumption save the cost of generating expensive peak energy. All consumers either benefit from reduced peak prices in a market environment, or from reduced average costs in a regulated environment. Peak reduction is thus a highly leveraged win for all consumers. In the longer term, the use of demand response/load management programs as a generation resource avoids building expensive peak generation. A Smart Grid is a key enabler in achieving demand response / load management; communicating peak prices to consumers; and integrating smart appliances, consumer storage and distributed generation, and smart building controls with the goal of peak reduction.

6A.10 CONVENIENCE OF DISTRIBUTED GENERATION

The new energy paradigm does not just empower utility consumers to better manage their consumption, reduce demand, and help the environment; through distributed generation, it can enable them to become energy producers. Distributed generation assets are typically consumer owned and rely on a range of generation technologies that deliver electricity directly to the consumer. Onsite photovoltaic panels and small-scale wind turbines are familiar examples. Emerging distributed generation resources include geothermal, biomass, carbon-free hydrogen fuel cells, PHEVs, and batteries for energy storage. As the cost of traditional energy sources continues to rise and the cost of distributed generation technologies declines affordable. Renewable energy resources are not only environmentally friendly; they create cost-saving opportunities for consumers who are able to generate electricity in excess of their own needs and sell the surplus back to the grid.

6A.11 COST SAVINGS THROUGH ENERGY EFFICIENCY

Today's new smart metering and communication technology could enable consumers and system operators to monitor and potentially control consumption—and cost—at 15-minute intervals. Such improved awareness gives consumers incentives to reduce energy use by switching to more efficient appliances and light bulbs, adjusting thermostat temperatures, and turning off lights and other energy-consuming devices when not in use. Consumers will become more active participants in the energy market, as they will be able to more easily compare monthly bills applying different electric retailers' rates to their actual usage. Improved market transparency will allow consumers to easily seek the best retail prices and services. Based on nationwide pilot data, consumers could reduce their electricity consumption by up to 25% during peak periods.

6A.12 CONVENIENCE OF ADVANCED METERS

With two-way communications between the consumer's meter and the utility, automated meter reading is much easier for consumers and utilities alike. Not only are digital smart meters more accurate, but they also will greatly reduce the number of estimated readings due to inaccessible meters. Smart Grid technologies will also allow utilities to connect and disconnect electric service remotely, making it easier and faster for consumers to start, stop, or transfer service, as well as change retail electric providers.

6A.13 REDUCED INDUSTRIAL CONSUMER COSTS

Commercial and industrial consumers will benefit greatly from a Smart Grid. For example, electric motors account for about 65% of industrial electricity usage. This is because motors power virtually every moving process necessary for power generation, oil and mining extraction, compression and pumping for heating and cooling buildings, as well as moving conveyors in discrete and process manufacturing like pharmaceuticals and automobiles. Small improvements in motor efficiency can therefore generate significant savings in energy costs. Only a small percentage of large motors are controlled by variable speed drives as opposed to traditional fixed drives which run at full speed all the time. A U.S. motor challenge study indicated that 85 billion kilowatt hours (kWh) per year could be saved using variable drives and high-efficiency motors. A variable speed drive can reduce a motor's energy consumption by as much as 60%. Further, a variable speed drive can be enabled to respond automatically to pricing signals from the utility; this could have a major impact on a firm's total consumption requirements and costs, as well as energy-efficiency benefits for society at large.

6A.14 ENHANCED BUSINESS CONSUMER SERVICE

According to [EPRI](#), a Smart Grid will allow automatic monitoring and proactive maintenance of end-use equipment, which can be an avenue for energy savings and reduced carbon emissions. Equipment is sometimes not properly commissioned when it is first installed or replaced. With the two-way communications of a Smart Grid infrastructure in place, a utility could monitor the performance of major consumer equipment through advanced interval metering and on-premise energy management control systems. The utility would thus be able to advise the consumer on the condition of specific facilities. EPRI estimates that this could

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2010

lead to an annual energy savings potential of 2.2 billion–8.8 billion kWh, depending on the level of market penetration.

Research from [Energy Insights](#), an IDC Company, indicates that consumers are interested in the opportunities offered by a Smart Grid. Results from the 2007 Energy Insights [National Residential Online Panel In-Home Display Survey](#) found that most people surveyed are interested in having such a unit to provide direct feedback on their energy use. About 70% expressed high interest, with an additional 20% expressing moderate interest. Although consumers are less enthusiastic about giving their utility control over their appliances, a third said they would be more likely to sign up for a dynamic pricing program if their utility could use the in-home display to automate their appliances.

Findings from Energy Insights' [2008 National Residential Online Panel Real-Time Pricing \(RTP\) Survey](#) show that a large group of consumers is interested in RTP. Results from [Ameren's Energy-Smart Pricing Plan \(ESPP\)](#) pilot in Illinois and its subsequent Power Smart Pricing program also prove that consumers can and will respond to price signals; in fact, participants significantly reduced both their peak demand and energy consumption Kurt E. Yeager, [Facilitating the Transition to a Smart Electric Grid](#),¹¹ and Galvin Electricity Initiative, [Fact Sheet: The Path to Perfect Power: Policy Solutions](#),¹² Galvin Electricity Initiative,

-The biggest impediment to the smart electric grid transition is neither technical nor economic,¹³ said Kurt Yeager, Executive Director of the Galvin Electricity Initiative and President Emeritus of the Electric Power Research Institute (EPRI), in testimony before the House Committee on Energy and Commerce on May 3, 2007. -Instead, the transition is limited today by obsolete regulatory barriers and disincentives that echo from an earlier era.¹⁴ Those regulatory barriers and other challenges to a Smart Grid are discussed in detail below.

6A.15 REGULATORY CHALLENGES

The nation's electric power delivery system is much like the telecommunications network of the past—dated and increasingly costly for consumers. Three decades ago, one phone company was the monopoly provider of services across much of the United States, and it was illegal to plug other companies' telephones and devices into that company's network. Today, telecommunications choices and services are much greater thanks to legislation and technological advances that broke up the monopoly and later opened the door to competition in the telecommunications industry. [The Energy Independence and Security Act of 2007 \(EISA 2007\)](#), with its support for Smart Grid research and investment, is an important step forward in achieving similar results for the power industry, although more government involvement is needed to remove obstacles to further innovation.

State public utility commissions (PUCs) are responsible for ensuring that electric utilities under their jurisdiction provide safe and reliable service at a reasonable price. PUCs analyze and determine if proposed utility infrastructure investments, like the deployment of Smart Grid technologies, are prudent investments. Investments are often evaluated based upon actual and realizable benefits, and while future benefits may be considered, they must be evaluated appropriately. The state-by-state PUC approval process could create a patchwork approach, as different Smart Grid improvements could be adopted by neighboring states or even utilities within one state. PUCs also need to develop unique rate structures using Smart Grid

technology by creating special time-of-use rates, whether hourly, critical peak pricing, or some other modification from the existing approaches.

As technology advances and as the nation approaches the building of a Smart Grid, consumers and utilities will have a greater opportunity to control their electric consumption in response to price and system conditions.

6A.15 UTILITY BUSINESS MODEL

Many of today's utility business models are based upon the utility earning a negotiated return on prudent capital investments. It is not surprising, therefore, that the utilities responsible for making prudent investments focus on minimizing risk. Consequently, utilities are often slow to adopt new technologies that have not been extensively proven outside of a laboratory. In general, the existing utility business model does not provide economic rewards for cutting-edge utilities. In addition, the value of Smart Grid technologies has been difficult to quantify in a simple cost-benefit analysis due to the multi-tiered benefits they provide to the utility, the consumer, and society. Comparative financial metrics are difficult to achieve because each utility incorporating Smart Grid technologies has put a unique level of investment in a variety of technologies, as shown in the chapter 2 examples. In turn, the rewards—financial, operational, experiential, and otherwise—for first adopters are not generally recognized by other electric industry stakeholders. Existing electric rate structures create further complications. As a Smart Grid enables more conservation and distributed generation, regulators may have to address the problem of how to provide appropriate rewards to utilities for actions that will reduce total electricity sales.

6A.16 LACK OF A COORDINATED STRATEGY

The efficient evolution to a Smart Grid will require a coordinated strategy that relies upon building an appropriate electric infrastructure foundation to maximize utilization of the existing system. A Smart Grid is a new integrated operational and conceptual model for utility operations. Among other things, it envisions the real-time monitoring of all utility transformers, transmission and distribution line segments, generation units, and consumer usage, along with the ability to change the performance of each monitored device. This will require significant planning for both implementing a system-wide installation of monitoring devices (including monitoring devices at the consumer level), and for installing the equipment necessary to enable parts of the system to talk with other components and take rerouting, self-healing, and other actions independent of system operators. Developing such an integrated system requires a multi-year, phased installation of Smart Grid devices and upgraded computer and communication capabilities; those investing in this technology likely will not realize the value until the return value of the combined benefits of these technologies are achieved.

6A.17 COST

As discussed, the effort to move from using smarter technology to a Smart Grid is a significant undertaking that needs focused coordination both strategically and tactically. This undertaking also will require significant investment. Investors often face the challenges of access to capital to make these investments, as well as the lack of ability to bear the associated costs of the expenses. Utilities must grapple with making Smart Grid investments, knowing that significant

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2010

utility and consumer benefits may not occur for several years. A Smart Grid is a complex, comprehensive, and integrated monitoring and operating system; it will provide publicly observable benefits only after considerable investments have been made in upgrading the infrastructure of the nation's utilities and the monitoring and control devices in the homes and businesses of consumers. Investing in equipment and personnel training, for which there are few short-term benefits, creates operating costs that may be difficult to justify without policy direction and support from government agencies.

6A.18 CONSUMER IMPACTS

Intellectually, Americans can welcome a Smart Grid because it offers more efficient use of resources, while maximizing electricity services. However, in order for the typical consumer to accept and embrace the transformation to a Smart Grid, utilities and policymakers must communicate the benefits effectively to the public. Consumer benefits need to be defined and advocated by utilities and policymakers alike across all economic levels in order to overcome this hurdle.

6A.19 KEY INFRASTRUCTURE ISSUES

Without question, creating a Smart Grid presents many complex technical challenges. Chief among them are the integration issues associated with the automation systems that manage the nation's transmission and distribution networks, along with the interface codes and standards required to enable a more reliable and smoothly operating electric system. One of the most important foundations of a Smart Grid is at the [GridWise Architecture Council](#).

Grid is the interoperability that enables all of the required devices, technologies, and agents (for example, energy producers, consumers, and operators) to interact beneficially in the network. Interoperability has been defined as the ability of two or more systems or components to exchange information and to use the information that has been exchanged. In the case of a Smart Grid, these systems might include outage management, distribution management, condition-based maintenance, supervisory control and data acquisition (SCADA), advanced metering infrastructure (AMI), distribution planning, load forecasting, and a variety of systems that have not been designed or built yet.

Ultimately, when a new device is added to the system, interoperability will enable it to register itself in the grid upon installation, communicate its capabilities to neighboring systems, and cause the connectivity database and control algorithms to update themselves automatically. Evidence from other industries indicates that interoperability generates tangible cost savings and intangible benefits amounting to 0.3%–4% in cost savings or avoided construction. In the electric power industry, that could result in a net benefit of up to \$12.6 billion per year. A Smart Grid will require interoperability among the many technology components involved. New solutions must also be configured to exchange information with legacy systems, including existing back office systems and other systems that need to be connected.

The past 20 years have seen tremendous progress in collaborative efforts across the industry to address issues associated with interoperability. The various members in the [GridWise Alliance](#), [GridWise Architecture Council](#), and other organizations including the [American National Standards Institute](#), the [Electric Power Research Institute](#), the [International Electrotechnical Commission](#), the [Institute of Electrical and Electronics Engineers](#), and the

[National Rural Electric Cooperative Association](#) have created a knowledge base to draw upon and an initial set of standards and models the industry can implement. Common Information Model (CIM), [IntelliGrid Architecture](#), [MultiSpeak](#), Telecontrol Application Service Element 2 ([TASE-2](#)), Utility Communications Architecture (UCA) and the [GridWise Architecture Council](#) concepts all contain valuable knowledge to assist utilities and integrators in achieving interoperability. Industry support for continued development in several areas could significantly improve the potential state of interoperability, thereby improving the cost-benefit ratio of deploying a Smart Grid.

6A.20 SECURITY

The vision of a Smart Grid typically boasts enhanced system security. Indeed, the report [A Systems View of the Modern Grid](#), published by the U.S. Department of Energy (DOE) and the National Energy Technology Laboratory ([NETL](#)) in January 2007, includes -resists attackll as one of seven principal characteristics of the future Smart Grid. The DOE report goes on to list the following design features and functions:

- Identification of threats and vulnerabilities
- Protecting the network
- Inclusion of security risk in system planning
- Expected benefits include:
 - Reduced system vulnerability to physical or cyber attack
 - Minimal consequences of any disruption, including its extent, duration, or economic impact
- Using security-related improvements to also help optimize reliability, communications, computing, decision-making support and self-healing

However, many of the technologies being deployed to support Smart Grid projects—such as smart meters, sensors, and advanced communications networks—can themselves increase the vulnerability of the grid to cyber attacks. Accordingly, it is essential that Smart Grid deployment leverage the benefits of increased threat awareness while mitigating against the task. [Impact of the Financial Crisis on Technology Spending in the Utility Industry](#)

but one that can be addressed by being aware of the risks and leveraging security best practices from other industries.

6A.21 CREDIT CRISIS IMPACTS

The 2008 global financial crisis has dealt a major blow to business and consumers alike. In September 2008, MidAmerican Energy Holdings proposed acquiring [Constellation Energy Group, Inc.](#) (Constellation) for \$4.7 billion after Constellation's stock plunged 60% over the preceding three days on fears about the company's exposure to bankrupt Lehman Brothers and its overall liquidity situation. Two weeks later, Reliant Energy (Reliant), after its stock nose-dived on news that it was losing a credit arrangement with Merrill Lynch and was raising \$1 billion in new, more expensive capital, announced that it had formed a special committee to review strategic alternatives.

Despite media attention to the precarious financial situation of Constellation and Reliant, the majority of U.S. investor-owned utilities are vertically integrated and dominated by their regulated operations. These companies have little or no credit risk from trading or hedging activities and are unlikely to fall victim to the problems that beset Constellation and Reliant. Nonetheless, some analysts believe that technology spending will slow in the near term as utility chief information officers conserve cash by freezing or slowing down all external spending, primarily due to the tight commercial paper market which has made short-term cash difficult and [costly to raise](#). Over the next one to two years, the credit crisis will probably make the cost of capital more expensive, even for utilities with good credit ratings. At the same time, state utility regulators are becoming increasingly reticent to approve large capital expenditures, given the existing risks associated with the rising costs of labor and materials, the uncertainty surrounding the cost of carbon regulation in an inevitable mandatory carbon cap-and-trade program in the United States (at least for fossil fuel plants), and the unknown impact of a recession on demand growth. The credit crisis means that utilities in some jurisdictions may delay raising capital to build new large power plants and transmission lines, which can cost billions of dollars.

Despite this expected slowdown in spending for large capital projects, energy demand will continue to grow (albeit at a slower rate) and state utility regulators will continue to enforce renewable-energy, CO₂-reduction, and energy-efficiency goals. This situation will make distributed energy, demand response management programs, and energy-efficient technology investments more attractive, particularly in light of the [Emergency Economic Stabilization Act of 2008](#). Tucked into the \$700 billion rescue legislation is a measure allowing utilities to quickly write off investments in smart meters or other Smart Grid equipment. Worth \$915 million over 10 years, the tax treatment in this legislation allows companies to depreciate investments over 10 years instead of 20 years, in essence taking bigger deductions each year. As a result, spending on renewable energy, distributed energy, smart metering, and Smart Grid-related technology is likely to increase over the next one to two years.



6A.21 CONCLUSION

A Smart Grid presents opportunities for utilities and consumers to benefit from efficient management of energy and advanced equipment and devices. It offers significant opportunities to wisely manage the nation's fuel resources by potentially reducing the national need for additional generation sources, better integrating renewable and non-renewable generation sources into the grid's operations, reducing outages and cascading problems, and enabling consumers to better manage their energy consumption. DOE has the opportunity to address many of these challenges and accelerate the deployment schedule so that the nation can achieve the many benefits a Smart Grid offers. The [Electricity Advisory Committee](#) (EAC) found that it is in the best interest of the nation to accelerate the cost-effective deployment of Smart

Grid technologies. A Smart Grid can be a mechanism for achieving the nation's goals in the areas of energy security, climate change, grid reliability, economic growth, and national competitiveness. At the same time, there are serious challenges to the timely development of a Smart Grid. Accordingly, the EAC offered several recommendations to the U.S. Department of Energy.

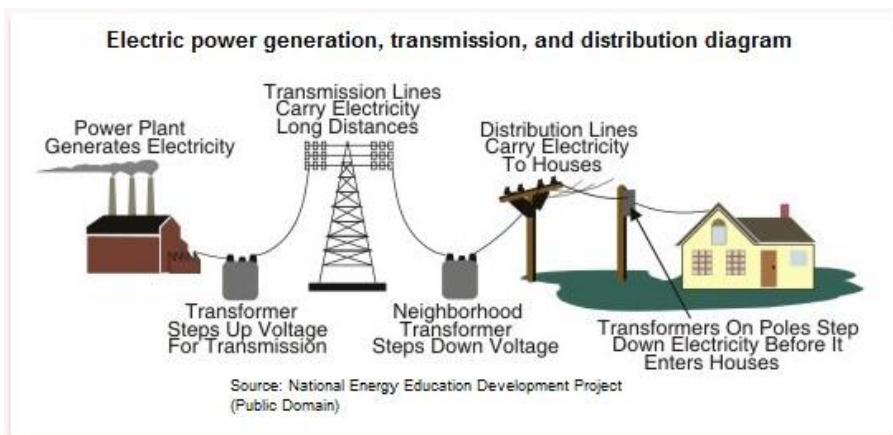
6.1 STATE OF DELAWARE ELECTRICITY PROFILE

[Delaware Updated Quick Energy Facts Click Here!](#)

Delaware's electricity generation capacity is among the lowest in the Nation. In recent years, coal-fired power plants have accounted for about three-fifths of electricity generation within the State, natural gas-fired plants have accounted for about one-fifth, and petroleum-fired plants have accounted for about one-tenth. Delaware receives its coal supplies primarily by rail from West Virginia, Kentucky, Colorado, and Virginia. More than one-fourth of Delaware households use electricity as their primary energy source for home heating.

Delaware currently produces minimal renewable energy, but plans to increase renewable energy generation are in development. In May 2009, the U.S. Department of the Interior approved Bluewater Wind to build two meteorological towers off the coasts of New Jersey and Rehoboth Beach, Delaware, that will allow the company to map weather patterns for determining the location of an offshore wind farm. In July 2007, Delaware expanded its renewable portfolio standard to require that 2 percent of the state's electricity be generated from solar photovoltaic sources in addition to 18 percent from other renewable sources by 2019.

Electrical power starts at the power plant. Power travels from the power plant to Delaware Communities through the **Power Distribution Grid**. In almost all



cases the power plant consists of a spinning electrical generator. Spinning the generator might be a water wheel in a hydroelectric dam, a large diesel engine or a gas turbine. In most cases the generator is a steam turbine. The steam might be created by burning coal, oil, natural gas, or a nuclear power plant. No matter what it is that spins the generator, all commercial electrical generators of any size generate what is called 3-phase AC power. Out of every power plant come four wires: the three phases plus a neutral or ground common to all three. The 3-phase power leaves the generator and enters a transmission substation at the power plant. Substations use large transformers to convert the generator's voltage (which is at the thousands of volts level) up to extremely high voltages for long-distance transmission on the transmission grid.

Typical voltages for long distance transmission are in the 155,000 to 765,000 volt range in order to reduce line losses. High-voltage transmission lines are located are installed on huge steel towers. All power towers have three wires for the three phases. The towers have ground wires running along the tops in an attempt to attract lightning. Power to a home or business comes off the transmission grid and is stepped-down in a distribution grid and may happen in several phases. The place where the conversion from "transmission" to "distribution" occurs is

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

in a power substation. A power substation has transformers that step transmission voltages (in the tens or hundreds of thousands of volts range) down to distribution voltages (typically less than 10,000 volts). It also has a "bus" that can split the distribution power off in multiple directions.

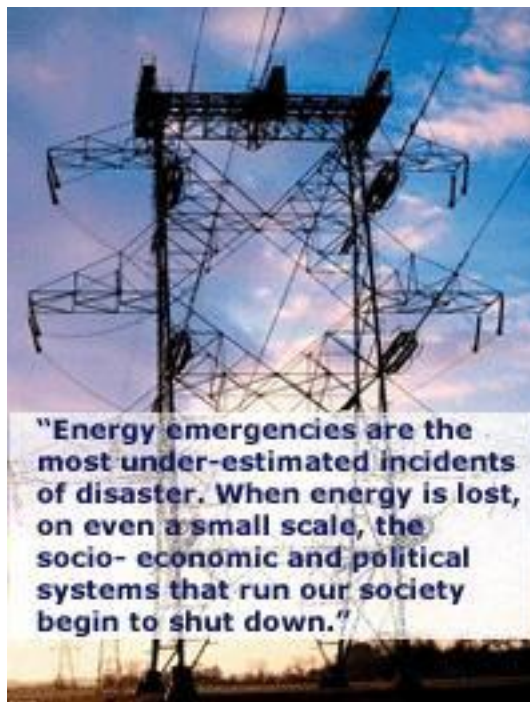
This includes circuit breakers and switches so that the substation can be disconnected from the transmission grid or separate distribution lines can be disconnected from the substation when necessary. A typical home or business includes a set of poles with one phase of power (at 7,200 volts) and a ground wire although sometimes there will be two or three phases on the pole, depending on where the house is located in the distribution grid). At each house, there is a transformer drum attached to the pole. In some cases you will often see a large green box near the entrance to a subdivision. It is performing the step-down function for the subdivision.

Electricity is one of the two dominant energy sources in both the residential and commercial sectors. It is important to industry as well; but over and above its role in heating and cooling, electricity powers Delaware's communications, computer and control support technologies. Even if its Btu value were lower, its support function would make it a critical energy source.

Delaware's electricity profile is complicated. It is a combination of free enterprise, cooperatively- and government-owned regulated and unregulated entities using several different sources of power for generation. It is connected to, and interacts with, regional electric power grids and, more so than other sources of

energy, is potentially exposed to interruption at every point from generation to final distribution. There are several

The term "load pocket" refers to a geographic area of load where transmission constraints preclude access to additional generation located outside the area. In a load pocket, additional demand must be met by generation located within the area. The Delmarva Peninsula lies between the Chesapeake Bay to the west and the Delaware Bay and the Atlantic Ocean to the east, and consists of the Eastern Shores of Maryland and Virginia and the bulk of Delaware. It is a load pocket and, therefore, is more susceptible than other areas to load, supply and transmission issues that affect the reliability and price of electricity.



Electricity Indicators
Primary Indicators:
<ul style="list-style-type: none">• Electricity production• Surplus and reserve generation capacity• Level of generating fuel stocks• Planned curtailment activity
Secondary Indicators:
<ul style="list-style-type: none">• Power system outages• Forecasted availability of generating fuel stocks• Availability of power pool reserves
Figure 6.2

suppliers of electricity in Delaware (see fig

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Because of its unique geographical configuration, transmission import capability onto the Peninsula is limited from the Chesapeake & Delaware Canal (south of Wilmington) to the southern tip of the Peninsula, and there is no import capability from the south.

On July 6, 1999, Conectiv Power Delivery, d/b/a Delmarva Power & Light Company ("Conectiv"), was forced to implement rolling blackouts. The rolling blackouts generated an investigation (Delaware PSC Docket No. 99-328), the Delaware PSC concluded that the cause of the outages had been an unexpected failure of one of Conectiv's generating units, coupled with unusually hot and humid weather conditions and the pre-existing outages of some of Conectiv's other generating units.

The Peninsula's vulnerability as a load pocket was illustrated by the July 1999 outage. Although power was available in [PJM](#), the constrained transmission into the Peninsula did not allow enough of the power that was available to reach the Peninsula. Consequently, emergency measures, including rotating load shedding, were undertaken. During load shedding, the DEMA Public Information Officer (PIO) and local media may be helpful in reducing electricity load in the areas.

6.1.1 MIDDLE-ATLANTIC POWER PROJECT

Much of the East Coast relies on a congested power system that can't meet rising demand without significant upgrades. In the past 30 years, the population of this region has risen dramatically and today's American home uses 21 percent more power than in the mid 1970s.

As a result of this increasing demand for power, the existing transmission system in the region will not be able to keep up in the years ahead. Experts such as [PJM](#), the regional transmission operator and the [U.S. Department of Energy](#) have concluded that building new transmission will help address this problem.

The MAPP project is a 150-mile transmission line that will significantly increase the region's ability to import power. Local utilities and electric cooperatives rely on this transmission system to keep the lights on for their customers and early estimates suggest that the entire MAPP line, which crosses three states, could bring enough new power to the region to light up an additional 800,000 to 2 million homes ([see route](#)).



STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

6.2 CONTINGENCY ISSUES

Coal and natural gas supplies are quite reliable. Delaware is unlikely to be affected by freezing coal piles but its coal supply could be vulnerable to a labor related reduction. Natural gas is rapidly becoming a fuel of choice for generating electricity because of its clean burning quality. The rapid increase in gas-fired generation contributed to extremely high gas prices during the winter of 2000 – 2001. Actual supply, however, was never in jeopardy. The largest investor-owned utilities include contingency plans in their published tariffs.

On July 6, 1999, Conectiv Power Delivery, d/b/a Delmarva Power & Light Company ("Conectiv"), was forced to implement rolling blackouts. The rolling blackouts generated an investigation (Delaware PSC Docket No. 99-328), the Delaware PSC concluded that the cause of the outages had been an unexpected failure of one of Conectiv's generating units, coupled with unusually hot and humid weather conditions and the pre-existing outages of some of Conectiv's other generating units.

Table 2. Delaware Ten Largest Plants by Generation Capacity, 2008

Plant	Primary Energy Source or Technology	Operating Company	Net Summer Capacity (MW)
1. Hay Road	Gas	Conectiv Delmarva Gen Inc	1,090
2. Indian River Operations	Coal	Indian River Operations Inc	797
3. Edge Moor	Coal	Conectiv Delmarva Gen Inc	718
4. Delaware City Plant	Other Gases	The Premcor Refining Group Inc	307
5. McKee Run	Gas	NAES Corporation	136
6. NRG Energy Center Dover	Coal	NRG Energy Center Dover LLC	100
7. Warren F Sam Beasley Generation Station	Gas	Delaware Municipal Electric Corp	48
8. Christiana	Petroleum	Conectiv Delmarva Gen Inc	44
9. Van Sant Station	Gas	NAES Corporation	39
10. Seaford Delaware Plant	Coal	<u>Invista</u>	27
MW = Megawatt. Source: U.S. Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."			

The Peninsula's vulnerability as a load pocket was illustrated by the July 1999 outage. Although power was available in PJM, the constrained transmission into the Peninsula did not allow enough of the power that was available to reach the Peninsula. Consequently, emergency measures, including rotating load shedding, were undertaken. During load shedding, the DEMA PIO and local media may be helpful in reducing electricity load in the areas.

6.2.1 WHAT COULD GO WRONG?

A coal shortage emergency could occur due to a possible disruption in the supply system to include a mix of the following factors:

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- Out-of-state coal trains and rail facilities become inoperable due to weather, accident, labor problems at the mining site, and train labor problems
- Generating plants could be affected by freezing coal piles.
- An imbalance of supply and demand

6.3. DELAWARE ELECTRIC PROVIDERS

Below is a list of Electric Service Providers in Delaware. The list serves as a reference for Delawareans wanting to see what is available from each Electric Service Provider in the form of incentives or grants for the installation of energy efficiency renewable energy products.

If you are looking for incentive programs available in Delaware, select from the list below to go directly to your utility for a description of each electric service provider in Delaware, the size of the customer base, and kilowatt hour sales from past years. There is also a summary of the interconnection and net metering policies for small power producers and information regarding any existing energy efficiency or renewable energy programs managed by each utility.

- [Delaware Electric Coop](#)
- [Delmarva Power](#)
- [Town of Clayton](#)
- [City of Dover](#)
- [Lewes Board of Public Works](#)
- [City of Newark](#)
- [City of Seaford](#)
- [Town of Smyrna](#)
- [Town of Middletown](#)
- [City of Milford](#)
- [New Castle Municipal Services Commission](#)

6.3.1 ELECTRICITY AND HOME FURNACES

Most natural gas, propane, and fuel oil furnaces rely on electricity to power the various fans and electrical devices. During a severe or prolonged shortage of electricity, it may be necessary to open temporary shelters for individuals or families who have run out of fuel or whose furnaces will not function due to a loss of electricity. In response to this possible emergency, DEMA, local governments, and the Red Cross have an established system with mass care and shelter providers that may be utilized. Local chapters of the American Red Cross are prepared through the national, regional, and state organizations to provide emergency shelter care.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

6.4 Phase I - Monitor and Alert Activities - Electricity Distribution Shortage

Phase I - Monitor and Alert - Involves the normal ongoing energy supply, demand and price monitoring. State agencies regularly monitor data and information as it becomes available through energy supply reporting systems ([see Appendix F on Monitoring Fuel Supplies](#)) and pay special attention to supply and distribution problems.

Activity	Lead Agency	Support Agency
Monitors international and domestic events	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC DE Delaware Public Service Commission (PSC)
Trains appropriate Delaware Energy Office staff.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
Attends periodic exercises to establish and test emergency protocols.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
Updates and maintains a network of public and private sector contacts. Prepares Internal memos.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO

Phase II - Assess and Determine Action - Electricity Supply Shortage

Phase II - Assess and Determine Action - In Phase II, having noticed early signs of what might become an energy emergency, responding agencies intensify data and information collection efforts and ensure that the most recent information is available. This information is analyzed to evaluate potential outcomes and assess possible courses of action.

- Appropriate contacts throughout state government should be informed of the results of this assessment.
- Appropriate action can then be determined. If no action is required, monitoring and evaluation continue and further updates are made as changes occur.

Actions to Take:	Lead Agency	Support Agency
Communicate with a network of contacts in private and public sectors to monitor local conditions in the electricity supply and distribution market.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC Delaware Public Service Commission (PSC)
Prepare to implement Delaware government electricity emergency conservation program.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
Prepare to implement reduced temperatures and operating procedures in state owned buildings and facilities.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
Prepare to request all building owners and operators to reduce building temperatures and operating conditions.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Prepare to request employers to assist in electricity conservation efforts by modifying working hours and building temperatures.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
Notify all other agencies, associations, and companies that have roles in the ESF-12 plan of the escalation to Verification Phase I.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
If electricity shortage increases escalate to Pre-Emergency Phase III. Notify all city departments, agencies and companies of the escalation.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC State Departments Private Business Agencies
ELECTRICITY SHORTAGE PUBLIC INFORMATION PROGRAM		
The DEMA PIO will provide information to newspapers and radio and television stations for consumers on how to conserve electricity. The public must be informed as to what it can do to voluntarily conserve electricity. As staff deems certain mitigation measures appropriate, existing formatted public information announcements must be edited to describe the specific, current situation. The public will be apprised of the situation and must be given specific voluntary conservation measures to implement. In order for the public to cooperate in conservation measures, it must be fully informed on the gravity of the situation and must be given specific instructions on the conservation measures it is requested to implement.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies DEMA PIO	DEMA EOC State Departments DEMA PIO

Phase III - Actions and Feedback -Electricity Shortage

Phase III - Actions and Feedback - Once a decision has been made that specific state government action is necessary to assure the health, welfare, and safety of citizens, and the continued economic well-being of the state, Phase III activity begins. This includes:

- Implementing programs to maximize available supplies and/or to minimize existing demand levels and monitoring these activities to determine their effectiveness;
- Increasing the level of communication among state agencies and others;
- If the nature of the problem involves multiple states, information sharing among state energy coordinators, using the [EEAC](#) website, should begin; (the password-protected Energy Emergency Assurance Coordinators ([EEAC](#)) website through which authorized state energy emergency coordinators may access valuable energy security information, including daily news summaries, emergency situation reports, lessons learned from other states, links to outage and curtailment information, and the ability to email messages to colleagues in other jurisdictions). [more info](#)
- Convening emergency planning and response organizations to consider actions that might be taken by the various state departments and agencies;
- If implementation of voluntary programs or other emergency deterrent actions fail to mitigate the emergency, begin implementing additional actions;
- If the situation continues to deteriorate, recommending that a “State of Energy Emergency” be declared (usually by the Governor). The Governor may also be called upon to declare a “State of Disaster.” State legislation regarding “State of Energy Emergency” and/or “State of Disaster” will dictate further action and assign responsibility among pertinent parties; and
- If it appears that all other options available to the state prove inadequate, the next level of mobilization is to request federal assistance.

Federal assistance would generally be available in the case of a national/international energy emergency; The emergency planning agencies and representatives from other state departments, as appropriate, would be responsible for coordinating and monitoring federal programs; Federal assistance may be requested sooner without a declaration of a national emergency to provide the following;

- Waiver federal driver hour requirements [more info](#);
- Waiver vehicle [fuel air quality standards](#);
- Request Coast Guard to intensify ice breaking (if Delaware River is frozen hampering barge movement; and Request [Strategic Petroleum Reserve \(SPR\)](#) or the [Northeast Heating Oil Reserves](#).

Actions To Take	Lead Agency	Support Agency
Implement public information program and issue public appeals for voluntary electricity conservation.	<i>ESF-12 GROUP</i> Delaware DA - Energy Response Team Electric Utility Companies	DEMA EOC Delaware Public Service Commission (PSC)
Implement state energy emergency conservation program. Advise state departments to alter temperature and operating conditions in city buildings and facilities.	<i>ESF-12 GROUP</i> Delaware DA - Energy Response Team Electric Utility COMPANIES	State Departments City/County Agencies

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2010

If electricity shortage worsens escalate to Emergency Phase IV. DEMA will notify all agencies and companies of the escalation.	<i>ESF-12 GROUP</i> Delaware DA - Energy Response Team Electric Utility Companies	State Departments City/County Agencies
If electricity shortage is forecast to diminish and start to return to normal order a de-escalation back to Readiness Phase I. Notify all agencies and companies of the de-escalation.	<i>ESF-12 GROUP</i> Delaware DA - Energy Response Team Electric Utility Companies	State Departments City/County Agencies
Implement state energy emergency conservation program. Advise state departments to alter temperature and operating conditions in city buildings and facilities.	<i>ESF-12 GROUP</i> Delaware DA - Energy Response Team Electric Utility COMPANIES	State Departments City/County Agencies
If electricity shortage worsens escalate to Emergency Phase IV . DEMA will notify all agencies and companies of the escalation.	<i>ESF-12 GROUP</i> Delaware DA - Energy Response Team Electric Utility Companies	State Departments City/County Agencies
If electricity shortage is forecast to diminish and start to return to normal order a de-escalation back to Readiness Phase I . Notify all agencies and companies of the de-escalation.	<i>ESF-12 GROUP</i> Delaware DA - Energy Response Team Electric Utility Companies	State Departments City/County Agencies
ELECTRICITY SHORTAGE PUBLIC INFORMATION PROGRAM		
The same public information principles applicable to Phase II are also applicable to Phase III. Public information announcements will convey non-alarming tone. They will be informative and not cause panic buying of products and hoarding.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies DEMA PIO	Local Media Electric Company PIO
The DEMA PIO will provide information to consumers through newspapers and radio and television stations on how to conserve electricity. As staff deems certain mitigation measures appropriate, existing formatted public information announcements must be edited to describe the specific, current situation.	ESF-12 Group Delaware DA - Energy Response Team Electric Utility Companies DEMA PIO	Local Media Electric Company PIO
Phase IV - Review Lessons Learned - Electricity Distribution Shortage		
<p>Phase IV - Review Lessons Learned - In Phase IV, As emergency operations are phased out, responding state agencies should evaluate the emergency preparedness programs and activities that were implemented and report the results to interested parties such as the Governor's Office, cabinet level officers, legislative committees and energy policy councils. Evaluation activities should include:</p> <ul style="list-style-type: none"> • Reports describing the nature of the energy emergency and a chronology of the actions taken to respond to it; • Evaluation of mitigation actions results and of the effectiveness of specific actions taken to respond to the emergency; and • Critical reviews of the overall performance of the state's energy emergency plans in addressing an emergency. <p>It should be noted that movement from one phase to another is as much a matter of judgment as it is a matter of objective definition.</p>		

7.0 NATURAL GAS SHORTAGE EMERGENCY

7.1 NATURAL GAS OVERVIEW

([State Petroleum Energy Profile](#))

Natural gas is a naturally occurring hydrocarbon that consists mostly of methane. is usually found alone or in association with oil in underground formations of porous rock. During the production process, wells are drilled into the porous rock and pipes are used to bring the natural gas to the surface. North America's interconnected system of underground pipelines transports natural gas from production areas to consumers. delivers natural gas to local distribution companies, or LDCs, which use an extensive network of small-diameter distribution pipes or mains to bring natural gas service to residential, commercial, industrial and electricity generation customers. To help ensure reliable service, natural gas can be stored underground in salt caverns, aquifers and depleted reservoirs for use during peak demand. For additional information see:

<http://www.naturalgas.org/overview/overview.asp> .

7.1.1 CHESAPEAKE UTILITIES CORPORATION

Eastern Shore Natural Gas Company ([ESNG](#)), receives natural gas at two pipeline interconnections in southeastern Pennsylvania and one in northern Delaware. The pipeline transports and delivers natural gas through 370 miles of transmission pipeline to the Company's Delaware and Maryland Divisions, as well as four additional non-affiliated local distribution companies, three electric generation customers and 12 industrial customers located in Delaware, the Eastern Shore of Maryland and Pennsylvania. ESNG owns and operates the only transmission pipeline south of the Chesapeake and Delaware Canal. The Dover Gas Light Company, formed in 1859, would eventually become Chesapeake Utilities Corporation, even though the Company wasn't officially incorporated in the State of Delaware until 88 years later in 1947.

The very next year, the Company acquired two smaller gas companies, one in Seaford, Delaware, and the other in nearby Salisbury, Maryland, and the Company hasn't stopped growing ever since. Today, the Company consists of four primary business segments:




STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- Natural gas distribution, transmission and marketing;
- Propane distribution and wholesale marketing;
- Advanced information systems; and
- Other services.

In total, Chesapeake employs approximately 448 people, and subscribes to the philosophy that the business is a partnership between our customers, our employees, the communities we serve, our investors and our business partners. Chesapeake serves residential, commercial and industrial customers in high growth areas of Delaware (see chart right). The Company's Delaware and Maryland natural gas distribution operation is known as "Chesapeake Utilities."

Chesapeake Utilities (chpkgas.com) serves customers in southern New Castle, Kent and Sussex Counties in Delaware and the Eastern Shore of Maryland, with the exception of one municipal system. The utility ([Gas](#)), receives natural gas at two pipeline interconnections in southeastern Pennsylvania and one in northern Delaware.

 Delaware Annual Natural Gas Consumption (Bcf)	
Residential	9
Commercial	5
Industrial	25
Electric Power Generation	13
Total Consumption	53
Source: American Gas Association	

7.2 DESCRIPTION

Natural gas is a mixture of hydrocarbons found issuing from the ground or obtained from specially drilled wells. The composition of natural gas varies in different localities. Its chief component, methane, usually makes up from 80 to 95 percent, and the balance is composed of varying amounts of ethane, propane, butane, and other hydrocarbon compounds. Because of its flammability and high calorific value, natural gas is used extensively as a fuel.

On the Delaware Peninsula there is limited availability of natural gas pipeline and storage capability. Only Eastern Shore Natural Gas Company ("ESNG") has transmission pipelines located below the Chesapeake & Delaware Canal on the Peninsula. Two of the pipelines serve New

Castle and Kent counties and the upper portion of Sussex County; one of them continues south into Maryland and terminates in Salisbury, Maryland. The second branches west and provides gas to three Maryland counties on the Eastern Shore of the Chesapeake Bay. The lower portion of the Peninsula (Maryland's lower Eastern Shore and all of Virginia's Eastern Shore) has no access at all to natural gas.

Delaware Natural Gas Customers	
Residential	111,845
Commercial	9,639
Industrial	247
Total Customers	121,731
Gas Pipeline and Main (miles)	2,614
Source: American Gas Association	

According to the American Gas Association there are 2,614 miles of gas pipelines and

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

mains in Delaware and four gas utility companies. This distribution system includes regulators, which maintains the gas pressure at 32 psi. in most of the State.

7.3 NATURAL GAS SHORTAGE

A natural gas shortage emergency could occur due to a possible disruption in the supply system to include a mix of the following factors:

- Rupture of pipeline intrastate or interstate.
- Shortage due to labor strikes.
- Reduction in supply for political or economic reasons.
- A supply and demand imbalance.

7.4 DELAWARE NATURAL GAS SUPPLY

The natural gas industry is a regulated public utility. It comes under the regulation of the Delaware Public Utilities Commission (PSC). Because it is a regulated public utility, the PSC prescribes its rate structure and rules under which it must operate. These operational rules include provision of procedures and resources to address a shortfall in supply or some other event or events that would cause a disruption of supply.

7.5 WHAT CAN GO WRONG?

1. Natural gas pipelines supplying natural gas to power plants may rupture or be disabled due to accidental damage. Recently in Wyoming a bulldozer accidentally hit a large east-west gas main near a construction site. The pipeline company quickly re-routed the gas supply before any crisis occurred.
2. Natural gas pipelines and facilities become overloaded during peak electricity demand periods (power plants using natural gas).
3. Terrorism to a natural gas pipeline.



7.6 NATURAL GAS TRANSMISSION

After raw gas from the wellhead is processed, it is moved into a pipeline system for transportation to an area where it will be sold. A pipeline company is a totally separate company from a producer or a distributor, although sometimes pipelines sell gas directly to large customers. The interstate pipeline system is massive, reliable, and efficient. Over 300,000 miles of transmission pipelines deliver natural gas to more than 175 million North American consumers in the United States, Canada and Mexico. While

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

most electric energy is delivered through integrated utility companies, other industry segments coordinate to bring natural gas from producing wells to homes and industry. Pipelines serve as the highways of the gas industry, making it possible for gas sellers and buyers to reach each other.

Gas pipelines are made of steel piping, measuring anywhere from 20 to 42 inches in diameter. When natural gas is moved through a pipeline, it is transmitted at higher pressures (from 200 to 1500 psi) to reduce the volume of the gas, and provide a pushing force to propel the gas through the pipe. In order to maintain the level of pressure required to move the large volumes of gas through a pipeline, the gas needs to be compressed periodically as it moves through the pipeline. This requires pipelines to install compressor stations every 100 miles along the pipeline. The Hugoton Embayment of southwest Kansas is a premier resource of natural gas and propane in the United States and the world. The Hugoton Field is the largest gas field in North America and one of the largest gas fields in the world. Since 1928, the gas fields of southwestern Kansas, have produced over 26 trillion cubic feet of gas.

On the Delaware Peninsula there is limited availability of natural gas pipeline and storage capability. Only Eastern Shore Natural Gas Company ("ESNG") has transmission pipelines located below the Chesapeake & Delaware Canal on the Peninsula. Two of those pipelines serve New Castle and Kent counties and the upper portion of Sussex County; one of them continues south into Maryland and terminates in Salisbury, Maryland. The second branches west and provides gas to three Maryland counties on the Eastern Shore of the Chesapeake Bay. The lower portion of the Peninsula (Maryland's lower Eastern Shore and all of Virginia's Eastern Shore) has no access at all to natural gas.

According to the American Gas Association there are 2,614 miles of gas pipelines and mains in Delaware and four gas utility companies. This distribution system includes regulators, which maintains the gas pressure at 32 p.s.i. through most of the State.

Delaware Natural Gas Customers

Residential	111,845
Commercial	9,639
Industrial	247
Total Customers	121,731
Gas Pipeline and Main (miles)	2,614

Source: American Gas Association
Figure 7.3

Natural Gas Units

ICF (cubic foot) = 1,000 Btu = 1 MBH

ICCF = 100 CF = 100,000 Btu = 100 MBH = 1 THERM

IMCF = 1,000 CF = 1,000,000 Btu = DecaTHERM

Figure 7.4

Natural Gas Pipeline Companies

Kinder Morgan Interstate Gas Transmission
500 Dallas Street, Suite 1000
Houston, Texas 77002 (713) 369-9000

Williams Gas Pipeline (South Central)

3800 Frederica Street

Owensboro, Kentucky 42301

(270) 926-8686

24-hour Gas Control (800) 324-9696

Tengasco
603 Main Street, Suite 500
Knoxville, TN 37902 (865) 523-1124

Figure 7.6

7.3 NATURAL GAS SHORTAGE

A natural gas shortage emergency could occur due to a possible disruption in the supply system to include a mix of the following factors:

- Rupture of pipeline intrastate or interstate.
- Shortage due to labor strikes.
- Reduction in supply for political or economic reasons.
- A supply and demand imbalance.

Delaware Heating Fuel Use	
Delaware Population (2004)	830,364
Delaware Housing Units	352,031
Natural Gas Customers	111,845
Mobile Homes (Propane, kerosene, and Electric)	42,000
Heating Oil/Kerosene	85,556
Electric	66,082
Note: EPC assumes most mobile home residents use propane for heating http://quickfacts.census.gov/qfd/states/10000.html	

7.4 DELAWARE NATURAL GAS SUPPLY

The natural gas industry is a regulated public utility. It comes under the regulation of the Delaware Public Service Commission (PSC). Because it is a regulated public utility, the PSC prescribes its rate structure and rules under which it must operate. These operational rules include a provision of procedures and resources to address a shortfall in supply or some other event or events that would cause a disruption of supply.

NATURAL GAS USAGE

Space Heating. Natural gas is used as the primary heating fuel by over 121,731 of Delaware's population. In the residential sector, natural gas is typically piped into the home from the street main.

Domestic Hot Water Heating. Natural gas is used for domestic hot water heaters in most residential, commercial, and industrial buildings.

Cooking. Natural gas is used for cooking in both residential and commercial buildings along with electric ranges and cook-tops.

Appliances. There are some other gas fired appliances, including refrigerators and clothes dryers.

Industrial Processes. Some manufacturing companies that have underground piped natural gas distribution systems utilize natural gas in various manufacturing processes and production lines.

Electric Utilities. Electric utilities are looking to gas as a possible less polluting fuel. Natural gas is cheaper, cleaner, and more efficient than other fuels.

Figure 7.7

###

Although traditionally a propane consumer, the Delaware agricultural industry is increasing converting facilities such as brooder houses to natural gas heat.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

7.5 Phase I - Monitor and Alert Activities – Natural Gas Shortage

Phase I - In the Monitor and Alert, the DEO staff monitors international and domestic events. Attends periodic exercises to establish and test emergency protocols. Trains appropriate DEO staff. Updates and maintains a network of public and private sector contacts. Prepares Internal Advisory Reports as needed.

Official Actions To Take:	Lead	Support
Conduct appropriate telephone surveys for seasonal propane supplies and prices. Communicate with a network of contacts in private and public sectors to monitor local conditions in the propane market.	ESF-12 Group DEO Gas Companies	Propane Delivery Companies
Monitor media for local, national, and international events that might impact propane supplies and prices in the State.	ESF-12 Group DEO	State Departments Local Media
Prepare to implement state government emergency conservation program.	ESF-12 Group DEO	State Departments Local Media
Prepare to implement reduced temperatures and operating procedures in state buildings and facilities.	ESF-12 Group DEO	State Departments Local Media
Prepare to request all building owners and operators to reduce building temperatures and operating conditions	ESF-12 Group DEO	Businesses DEMA Staff
Prepare to request employers to assist in propane conservation efforts by modifying working hours and building temperatures.	ESF-12 Group DEO	DEMA Staff
Notify all other agencies, associations, and companies that have roles in the SEERP, and other New England state energy offices of the escalation to Pre-Emergency Phase II.	ESF-12 Group DEO	DEMA Staff
If propane fuel shortage increases, DEO and the DEMO Director may recommend to the Governor that the State escalate to Pre-Emergency Phase II. Notify all in-state and out-of-state agencies and companies of the escalation.	DEO DEMO Director ESF- 12 Group	DEMA Staff
Natural Gas Shortage Public Information Program		
DEMO PIO may provide information to newspapers and radio and television stations for consumers on how to conserve propane fuel. The public must be informed as to what it can do to voluntarily conserve propane. As staff deems certain mitigation measures appropriate, existing formatted public information announcements must be edited to describe the specific, current situation. The public will be notified of the situation and must be given specific voluntary conservation measures to implement. In order for the public to cooperate in conservation measures, it must be fully informed on the gravity of the situation and must be given specific instructions on the conservation measures it is requested to implement.	DEMO PIO	Local Media

7.6 Phase II - Assess and Determine Action - Natural Gas Shortage

Phase II is activated when supply problems of natural gas, are reported by reliable sources such as the fuel retailers, distributors, and the terminals. The Phase II may be activated if the DEO determines that a heating oil shortage is occurring or may shortly occur. During this phase, the DEO will: Rapidly determine the nature, extent, and duration of a potential, impending, or actual energy emergency. Coordinate energy emergency response activities with the DEMA, other appropriate state agencies, the U.S. Department of Energy, other state governments, local government agencies, and private industry. The DEO may provide a detailed Situation Report that assesses the potential or actual impacts of the emergency on energy prices and supplies. If required, use the informal fuels set-aside program to ensure that emergency and essential services receive adequate supplies of fuel. Recommend further actions (if any) to DEMA.

Official Actions To Take:	Lead	Support
Prepare to implement reduced temperatures and operating procedures in state buildings and facilities.	ESF-12 Group DEO Gas Companies	DEMA EOC State Departments
Prepare to request a voluntary reduction of natural gas by consumers, businesses, schools, institutions and state building operators.	ESF-12 Group DEO Gas Companies	DEMA EOC Businesses Local Government
The DEO and DEMA PIO requests to voluntarily assist in natural gas conservation efforts with certain high use activities.	ESF-12 Group DEO Gas Companies	DEMA EOC Local Media State Departments
Notify all other agencies, associations, and companies that have roles in the ESF 12 of the escalation to Pre-Emergency Phase II.	ESF-12 Group DEO Gas Companies	DEMA EOC DE Public Service Commission (PSC)
If monitoring activities indicate a possible shortage of natural gas, contact Energy and arrange a meeting to discuss possible escalation to Pre-Emergency Phase II. Determine from Energy or other agencies: causes, possible duration, and geographic extent of the shortage and steps the providers can take to alleviate or avert a shortage.	ESF-12 Group DEO Gas Companies	DEMA EOC DE Public Service Commission (PSC)
If natural gas shortage increases at the State level, the DEO and DEMA may recommend to the Governor of the State's escalation to Pre-Emergency Phase II. Notify all in-state agencies, local governments and companies of the escalation.	ESF-12 Group DEO Gas Companies Governor	DEMA EOC DE Public Service Commission (PSC)
Natural Gas Shortage Public Information Program		
The DEO and DEMA PIO will provide information to local governments, newspapers and radio and television stations for consumers on how to conserve natural gas. The public must be informed as to what it can do to voluntarily conserve natural gas. As staff deems certain mitigation measures appropriate, existing formatted public information announcements must be edited to describe the specific, current situation. The public will be apprised of the situation and must be given specific voluntary conservation measures to implement. In order for the public to cooperate in conservation measures, it must be fully informed on the gravity of the situation and must be given specific instructions on the conservation measures it is requested to implement.	ESF-12 Group DEO Gas Companies PIODEMA PIO	DEMA EOC DE Public Service Commission (PSC) Local Media State Departments
Figure 7.10		

7.7 Phase III - Actions and Feedback - Natural Gas Shortage		
<p>Phase III is activated the natural gas shortages increase and increased monitoring and conclusions reached by industry representatives and others directly involved indicate an impending motor fuels shortage. If the DEO determines the existence of a protracted or growing energy problem, the Pre-Emergency Phase III may be activated. This phase is characterized by an increased level of government activity as the energy problem worsens. During this phase, the DEO Planning staff will: Continue to coordinate energy emergency response activities with the Governor's Office of Emergency Services, other appropriate state agencies, the U.S. Department of Energy, other state governments, local government agencies, and private industry. Continue to provide periodic Situation Reports that describe the nature of the energy emergency, the potential or actual impacts on energy prices and supplies, and the expected duration of the event. If required, continue to use the informal fuels set-aside program to ensure that emergency and essential services receive adequate supplies of fuel. Recommend to the DEO appropriate voluntary demand reduction measures that may be used to mitigate the impacts of the propane fuel shortage.</p>		
Official Actions To Take:	Lead	Support
The DEO will increase monitoring and analysis of natural gas stocks, consumption patterns, prices, product delivery, including maintaining regular contact with suppliers and distributors regarding adequacy of natural gas product and will supply information to the DEMA EOC. Continue meetings with natural gas suppliers.	ESF-12 Group DEO Gas Companies	State Departments Local Media Local Government PIOs
The DEMA EOC implements public information program and may issue public appeals for voluntary natural gas conservation.	ESF-12 Group DEO Gas Companies DEMA PIO	State Departments Local Government Local Media
If monitoring activities indicates a possible sustained shortage of natural gas, contact the Delaware Public Service Commission and determine: causes, possible duration, and geographic extent of the shortage and steps the providers can take to alleviate or avert a shortage.	ESF-12 Group DEO Gas Companies	PSC State Departments Local Government Local Media
Implement Delaware emergency conservation program. Inform state departments to make adjustments to employee working hours, where possible, and reduce temperature and operating conditions in state buildings and facilities.	ESF-12 Group DEO Gas Companies	State Departments Local Media Businesses &Industry
If natural gas situation worsens the State escalates to Emergency Phase III the DEMA EOC will notify state departments and Delaware companies of the escalation.	ESF-12 Group DEO Gas Companies	State Departments Local Media Businesses &Industry
If natural gas shortage is forecast to diminish and start to return to normal the DEMA EOC will de-escalate back to Verification Phase I. The DEMA EOC will notify all state departments and local companies of the de-escalation.	ESF-12 Group DEO Gas Companies	State Departments Local Media Businesses &Industry
Natural Gas Shortage Public Information Program		
The DEMA PIO will provide information to newspapers and radio and television stations on how consumers can conserve natural gas. The public will be informed as to what it can do to voluntarily conserve natural gas.	ESF-12 Group DEO Gas Companies	State Departments Local Media Businesses &Industry
Implement procedures concerning media releases and interviews. Discuss the possibility of establishing a central media center and press briefings at scheduled times to facilitate news flow to the media.	ESF-12 Group DEO Gas Companies	State Departments Local Media Businesses &Industry

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2010

The DEMA PIO prepares public information announcements to describe the specific, current situation.	ESF-12 Group DEO Gas Companies	State Departments Local Media Businesses &Industry
The DEMA EOC will ensure the media is apprised of the situation and given specific voluntary conservation measures for the public to implement. Figure 7.11	ESF-12 Group DEO Gas Companies PIODEMA PIO	State Departments Local Media Businesses & Industry

7.8 Phase IV - Review Lessons Learned - Natural Gas Shortage

Phase IV - Review Lessons Learned - In Phase IV, As emergency operations are phased out, responding state agencies should evaluate the emergency preparedness programs and activities that were implemented and report the results to interested parties such as the Governor's Office, cabinet level officers, legislative committees and energy policy councils. Evaluation activities should include:

- Reports describing the nature of the energy emergency and a chronology of the actions taken to respond to it;
- Evaluation of mitigation actions results and of the effectiveness of specific actions taken to respond to the emergency; and
- Critical reviews of the overall performance of the state's energy emergency plans in addressing an emergency.
- It should be noted that movement from one phase to another is as much a matter of judgment as it is a matter of objective definition.

CHAPTER 8 – PROPANE SHORTAGE EMERGENCY

8.1 PROPANE DESCRIPTION

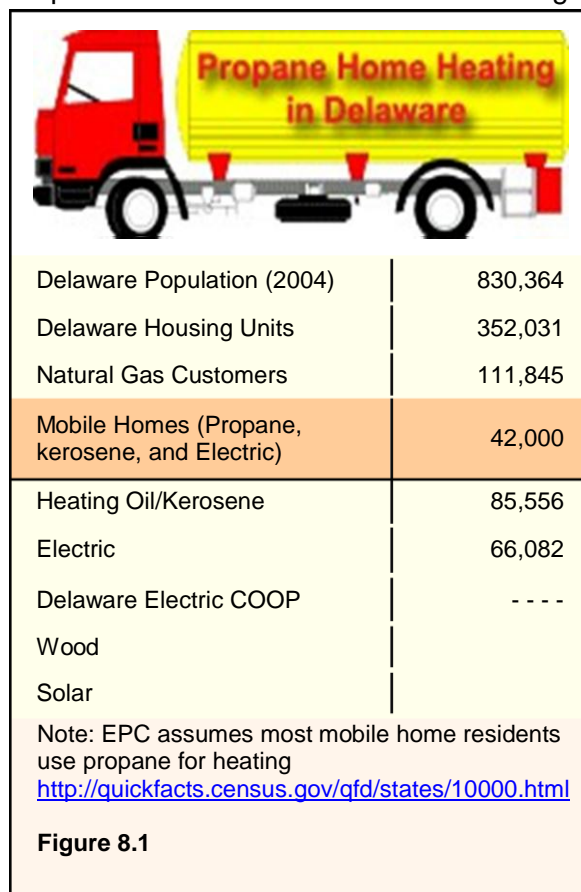
"Propane" (C₆H₈) is a normally gaseous straight-chain hydrocarbon. It is a colorless paraffinic gas that boils at a temperature of -43.67oF. It is extracted from natural gas or refinery gas streams. It also includes all products designated in ASTM Specification D1835 and Gas Processors Association Specifications for commercial propane and HD-5 propane.

Liquefied petroleum gases (LPGs) include gases produced at refineries and natural gas processing plants. Other plants separate the liquids into their various "fractions." Propane, ethane, butane, and mixtures consisting mainly of these three compounds are the most common LPGs. Natural gas is a mixture of about 90 percent methane, about five percent propane and about five percent other gases. These exist as gases in underground reservoirs.

These reservoirs also contain some liquids. These liquids are condensed from "wet" natural gas coming from the well are known as natural gas liquids (NGLs). NGLs come from gas processing plants. They include the lighter liquids (ethane, propane, and butane, and mixtures of these compounds) as well as the heavier liquids, natural gasoline, and plant condensate. Once the liquids have been removed and the natural gas is ready for burning, it is known as "dry" natural gas.

Like natural gas (methane), LP-gases are colorless and odorless. Like all fossil fuels, they are a non-renewable energy source. Although each is nontoxic and odorless, foul-smelling mercaptan is added so propane leaks can be easily detected. Because propane is heavier than

air, it sinks to the ground and can make vapor clouds. These pools can explode if a spark or match is struck. These gases dissipate quickly, so there are hardly ever explosions of this kind.



8.2 PROPANE SHORTAGE EMERGENCY

A propane shortage emergency could occur due to a possible disruption in the supply system to include a mix of the following factors:

- The fuel unloading facilities and/or other marine transport facilities become inaccessible due to hurricanes, severe winds, or ship accident in the channels. This includes the Delaware City (Port), Edgemoor (Port), Claymount (Port), and Wilmington (Port).

Delaware Historical Propane Consumption (Thousands of Barrels)					
Year	Residential	Commercial	Industrial	Transportation	Total
1998	1,041	184	199	3	1,427
1999	931	164	20	2	1,117
2000	734	130	140	2	1,006
2001	934	165	251	2	1,352
(Note Barrels is the standard unit here (42 gallons per barrel)) Source: http://www.eia.doe.gov/emeu/states/main_de.html Figure 8.2					

- Truck transport becomes constrained due to ice or snow.
- Shortage due to labor strikes.
- Delaware, Pennsylvania, and New Jersey refineries down for repairs or labor problems.
- Extended cold snap combined with just-in-time inventory management.
- Product shortage due to high export rate.
- Imports reduced for political or economic reasons.
- Imbalance in supply and demand.

8.3 PROPANE USAGE

Space Heating - Propane is used as one of the primary heating fuels by many of Delaware's population. In the residential sector, propane is typically used in homes in rural areas, especially those which have no provision for keeping the fuel supply in a heated area. There are 42,000 mobile homes in Delaware. Many of these mobile homes use kerosene as the primary heating fuel the remaining mobile homes use propane, electric, or natural gas for space heat, cooking, and hot water heaters.

Miscellaneous - Propane fuel is used in a number of types of portable and mobile equipments. Barbecue grills, camping lanterns, camping cook stoves, motor homes, house and camping trailers all use propane.

Industrial Processes - Some manufacturing companies that are located in areas that do not have underground piped natural gas distribution systems utilize propane in various manufacturing processes. It is used in product production lines.

Small Business - Restaurants use it for cooking in areas not served by natural gas pipelines. Some restaurants also use it for space heating. Other small businesses may use for space heating and domestic hot water.

Transportation - There are many propane-fueled trucks in the State. A more common use is by fork-lifts used in enclosed warehouses.

Public Utilities - The large natural gas public utilities in the State are required by the Public Utilities Commission to maintain a significant supply of reserve, alternate fuel in case of a

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

shortfall of natural gas supply due to a pipeline disruption or other causes. In-state stored propane supplies provide this emergency alternative fuel reserve for the natural gas systems.

8.5 Phase I - Monitor and Alert Activities - Propane Fuel Shortage		
Phase I - Monitor and Alert - Involves the normal ongoing energy supply, demand and price monitoring. State agencies regularly monitor data and information as it becomes available through energy supply reporting systems (see Appendix F on Monitoring Fuel Supplies) and pay special attention to supply and distribution problems. Activated when supply problems of natural gas are reported by the natural gas suppliers.		
Official Actions To Take:	Lead	Support
Conduct appropriate telephone surveys for seasonal propane supplies and prices. Communicate with a network of contacts in private and public sectors to monitor local conditions in the propane market.	ESF-12 Group DEO Gas Companies	Propane Delivery Companies
Monitor media for local, national, and international events that might impact propane supplies and prices in the State.	ESF-12 Group DEO	State Departments Local Media
Prepare to implement state government emergency conservation program.	ESF-12 Group DEO	State Departments Local Media
Prepare to implement reduced temperatures and operating procedures in state buildings and facilities.	ESF-12 Group DEO	State Departments Local Media
Prepare to request all building owners and operators to reduce building temperatures and operating conditions	ESF-12 Group DEO	Businesses DEMA Staff
Prepare to request employers to assist in propane conservation efforts by modifying working hours and building temperatures.	ESF-12 Group DEO	DEMA Staff
Notify all other agencies, associations, and companies that have roles in the SEERP, and other New England state energy offices of the escalation to Pre-Emergency Phase II.	ESF-12 Group DEO	DEMA Staff
If propane fuel shortage increases, DEO and the DEMA Director may recommend to the Governor that the State escalate to Verification Phase II. Notify all in-state and out-of-state agencies and companies of the escalation.	DEO DEMA Director ESF- 12 Group	DEMA Staff
Propane Shortage Public Information Program		
DEMA PIO may provide information to newspapers and radio and television stations for consumers on how to conserve propane fuel. The public must be informed as to what it can do to voluntarily conserve propane. As staff deems certain mitigation measures appropriate, existing formatted public information announcements must be edited to describe the specific, current situation. The public will be notified of the situation and must be given specific voluntary conservation measures to implement. In order for the public to cooperate in conservation measures, it must be fully informed on the gravity of the situation and must be given specific instructions on the conservation measures it is requested to implement.	DEMA PIO	Local Media

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

8.6 Phase II - Assess and Determine Action - Propane Gas Supply Shortage

Phase II - Assess and Determine Action - In Phase II, having noticed early signs of what might become an energy emergency, responding agencies intensify data and information collection efforts and ensure that the most recent information is available. This information is analyzed to evaluate potential outcomes and assess possible courses of action.

- Appropriate contacts throughout state government should be informed of the results of this assessment.
- Appropriate action can then be determined. If no action is required, monitoring and evaluation continue and further updates are made as changes occur.

The Propane Phase II - Assess and Determine Action is activated when supply problems of heating oil, are reported by reliable sources such as the fuel retailers, distributors, and the terminals. The Verification Phase II may be activated if the DEO determines that a heating oil shortage is occurring or may shortly occur. During this phase, the DEO will: Rapidly determine the nature, extent, and duration of a potential, impending, or actual energy emergency. Coordinate energy emergency response activities with the DEMA, other appropriate state agencies, the U.S. Department of Energy, other state governments, local government agencies, and private industry. The DEO may provide a detailed Situation Report that assesses the potential or actual impacts of the emergency on energy prices and supplies. If required, use the informal fuels set-aside program to ensure that emergency and essential services receive adequate supplies of fuel. Recommend further actions (if any) to DEMA.

Official Actions To Take:	Lead	Support
Conduct appropriate telephone surveys for seasonal propane supplies and prices. Communicate with a network of contacts in private and public sectors to monitor local conditions in the propane market.	ESF-12 Group DEO Gas Companies	Propane Delivery Companies
Monitor media for local, national, and international events that might impact propane supplies and prices in the State.	ESF-12 Group DEO	State Departments Local Media
Prepare to implement state government emergency conservation program.	ESF-12 Group DEO	State Departments Local Media
Prepare to implement reduced temperatures and operating procedures in state buildings and facilities.	ESF-12 Group DEO	State Departments Local Media
Prepare to request all building owners and operators to reduce building temperatures and operating conditions	ESF-12 Group DEO	Businesses DEMA Staff
Prepare to request employers to assist in propane conservation efforts by modifying working hours and building temperatures.	ESF-12 Group DEO	DEMA Staff
Notify all other agencies, associations, and companies that have roles in the SEERP, and other New England state energy offices of the escalation to Pre-Emergency Phase II.	ESF-12 Group DEO	DEMA Staff
If propane fuel shortage increases, DEO and the DEMA Director may recommend to the Governor that the State escalate to Pre-Emergency Phase III. Notify all in-state and out-of-state agencies and companies of the escalation.	DEO DEMA Director ESF-12 Group	DEMA Staff
If propane fuel shortage improves, the DEO and the DEMA Director may recommend to the Governor a de-escalation back to Readiness Phase I (normal conditions). Notify all in-state and out-of-state agencies and companies of the de-escalation.	DEO DEMA Director ESF-12 Group	DEMA Staff
Propane Shortage Public Information Program		
DEMA PIO may provide information to newspapers and radio and television stations for consumers on how to conserve propane fuel. The public must be informed as to what it can do to voluntarily conserve propane. As staff deems certain mitigation measures appropriate, existing formatted public information announcements must be edited to describe the specific, current situation. The public will be notified of the situation and must be given specific voluntary conservation measures to implement. In order for the public to cooperate in conservation measures, it must be fully informed on the gravity of the situation and must be given specific instructions on the conservation measures it is requested to implement.	DEMA PIO	Local Media

8.7 Phase III - Actions and Feedback - Propane Gas Shortage

Phase III - Actions and Feedback - Once a decision has been made that specific state government action is necessary to assure the health, welfare, and safety of citizens, and the continued economic well-being of the State, Phase III activity begins. This includes:

- Implementing programs to maximize available supplies and/or to minimize existing demand levels and monitoring these activities to determine their effectiveness;
- Increasing the level of communication among state agencies and others;
- If the nature of the problem involves multiple states, information sharing among state energy coordinators, using the [EEAC](#) website, should begin; (the password-protected Energy Emergency Assurance Coordinators ([EEAC](#)) website through which authorized state energy emergency coordinators may access valuable energy security information, including daily news summaries, emergency situation reports, lessons learned from other states, links to outage and curtailment information, and the ability to email messages to colleagues in other jurisdictions). [more info](#)
- Convening emergency planning and response organizations to consider actions that might be taken by the various state departments and agencies;
- If implementation of voluntary programs or other emergency deterrent actions fail to mitigate the emergency, begin implementing additional actions;
- If the situation continues to deteriorate, recommending that a "State of Energy Emergency" be declared (usually by the Governor). The Governor may also be called upon to declare a "State of Disaster." State legislation regarding "State of Energy Emergency" and/or "State of Disaster" will dictate further action and assign responsibility among pertinent parties; and
- If it appears that all other options available to the State prove inadequate, the next level of mobilization is to request federal assistance.

Federal assistance would generally be available in the case of a national/international energy emergency; The emergency planning agencies and representatives from other state departments, as appropriate, would be responsible for coordinating and monitoring federal programs; Federal assistance may be requested sooner without a declaration of a national emergency to provide the following;

- Waiver federal driver hour requirements [more info](#);
- Waiver vehicle [fuel air quality standards](#);
- Request Coast Guard to intensify ice breaking (if Delaware River is frozen hampering barge movement; and Request [Strategic Petroleum Reserve \(SPR\)](#) or the [Northeast Heating Oil Reserves](#).

Official Actions To Take:	Lead	Support
Increase monitoring and analysis of propane stocks, product deliveries, consumption patterns and prices, including maintaining regular contact with suppliers and distributors regarding adequacy of propane product. Continue consultations and meetings with members of the propane industry.	DEMA Staff DEO ESF-12 Group	DEMA Staff
Implement public information program and issue public appeals for voluntary conservation. See this section for Propane Conservation Measures and formatted Propane Public Announcements.	DEMA Staff DEO ESF-12 Group	DEMA Staff
If propane fuel situation worsens, DEO and the DEMA Director may recommend to the Governor that the State escalate to Emergency Phase III. DEMA will notify all in-state and out-of-state agencies and companies of the escalation.	DEMA Staff DEO ESF-12 Group	DEMA Staff State Departments Schools & Businesses

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

If propane fuel shortage is forecast to diminish and start to return to normal, DEO and the DEMA Director may recommend to the Governor a de-escalation back to Verification Phase I. Notify all in-state and out-of-state agencies and companies of the de-escalation.	DEMA Staff DEO ESF-12 Group	DEMA Staff State Departments Schools & Businesses
During a severe or prolonged shortage of propane, it may be necessary to open temporary shelters for individuals or families that have run out of fuel.	DEMA PIO DEMA Staff	Red Cross Delaware VOAD
Propane Shortage Public Information Program		
The same public information principles applicable to Phase II are also applicable to Phase III. The difference is that the situation is graver and more severe. In addition, the conservation measures imposed are mandatory. Public information announcements will convey non-alarming tone. They will be informative and not cause panic buying of product and hoarding. The public will be informed not only of the measures themselves, but also of the method of enforcing implementation of the conservation measures.	DEMA PIO DEMA Staff	Local Media DEMA Staff
The Governor requests, through DEMA and the media, voluntary conservation in residences by lowering thermostats or other controls to between 60 and 65 during the time the space is occupied during the day and evenings; between 55 and 60 at night; and to 50 in unoccupied facilities (see governor's press release Chapter 11).	DEMA PIO DEMA Staff	Local Media DEMA Staff
The public is carefully informed of the fully inform the public of the propane shortage and that the State is in Pre-Emergency Phase III. Public information announcements in must be extremely conscious of not being alarming in the tone of the announcements. They should be informative; but not cause panic buying of product and hoarding.	DEMA PIO DEMA Staff	Local Media DEMA Staff

8.8 Phase IV - Review Lessons Learned - Propane Gas Distribution Shortage

Phase IV - Review Lessons Learned - In Phase IV, As emergency operations are phased out, responding state agencies should evaluate the emergency preparedness programs and activities that were implemented and report the results to interested parties such as the Governor's Office, cabinet level officers, legislative committees and energy policy councils. Evaluation activities should include:

- Reports describing the nature of the energy emergency and a chronology of the actions taken to respond to it;
- Evaluation of mitigation actions results and of the effectiveness of specific actions taken to respond to the emergency; and
- Critical reviews of the overall performance of the State's energy emergency plans in addressing an emergency.

It should be noted that movement from one phase to another is as much a matter of judgment as it is a matter of objective definition.

CHAPTER 9 – HEATING OIL SHORTAGE EMERGENCY

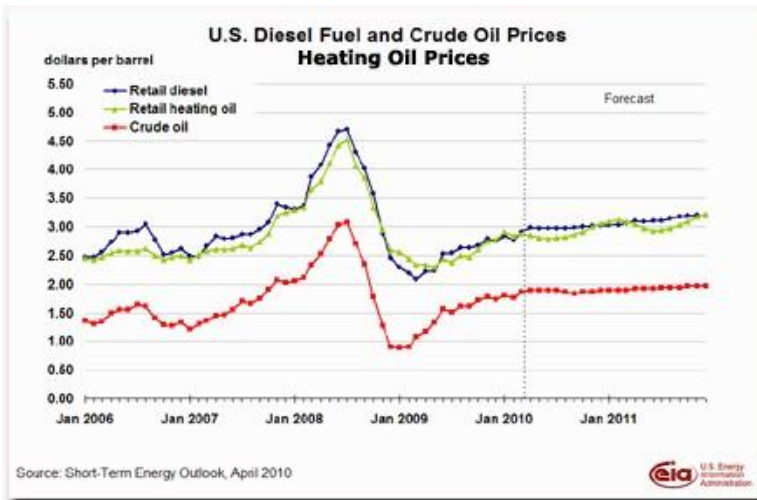
9.1 HEATING OIL AND KEROSENE DESCRIPTION

Kerosene and No. 2 fuel oil are the two types of residential heating oil used in Delaware. The Valero Refinery, in Delaware City, is the only refinery operating in the State. It has a capacity of 175,000 barrels per calendar day (BCD).

Delaware's crude oil supply generally enters by ship tanker or barge into the Delaware City (Port), Edgemoor (Port), Claymount (Port), and Wilmington (Port). Delaware fuel oil suppliers truck the product from the terminals to wholesale or retail distribution sites.

A heating oil emergency could occur due to a possible disruption in the supply system to include a mix of the following factors:

- Delaware, Pennsylvania, and New Jersey refineries down for repairs or labor problems
- Truck transport becomes constrained due to ice or snow.
- Unloading facilities inoperable due to weather or accident and including electricity failure.
- Truck transport constrained due to ice or snow
- Product shortage due to high export rate.
- Shortage due to labor strikes.
- Reduction in imports for political or economic reasons
- Imbalance in supply and demand.



9.2 KEROSENE DESCRIPTION

Kerosene is a colorless, thin mineral oil whose density is between 0.75 and 0.85 grams per cubic centimeter. A mixture of hydrocarbons, it is commonly obtained in the fractional distillation of petroleum as the portion boiling off between 150°C and 275°C (302°F–527°F). Kerosene has been recovered from other substances, notably coal (hence another name, coal oil), oil shale, and wood. Kerosene is also used in space heaters, cook stoves, and water heaters and is suitable for use as a light source when burned in wick-fed lamps. Kerosene has a maximum distillation temperature of 400 degrees Fahrenheit at the 10-percent recovery point, a final boiling point of 572 degrees Fahrenheit, and a minimum flash point of 100 degrees Fahrenheit. There are two grades of Kerosene (K-1 and K-2). Most oil dealers in Delaware prefer to sell the K-1 grade and do not stock the K-2. Kerosene No. K-1 is a very low sulfur grade of kerosene

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

and is typically used in un-vented heaters.

9.2.1 SUPPLY

Kerosene and heating oil is supplied in Delaware by several heating oil dealers ([see list below](#))

9.2.2 SPACE HEATING

Kerosene is used as primary heating fuel in about 20 percent of Delaware residences. There are approximately 42,000 mobile homes in Delaware (http://www.delaware.com/visit_delaware/census.cfm). Over 95% of these mobile homes use kerosene as the primary heating fuel since they have no provision for keeping the fuel supply in a heated area. Mobile homes are generally without basements and underground storage is not appropriate because of the higher cost of tank installation and the possible relocation of mobile homes from site to site.

Kerosene is also used for cooking, domestic hot water, and vented and unvented spaces heaters. Unvented space heaters may be moved from room to room. It is also an attractive option for low or medium income households because of its low initial cost and flexibility.

Projected Heating Oil Costs (Delaware)
890 Gallons
\$ 276.2 per gallon
\$ 2,458 Winter Cost
Figure 9.3

9.3 HEATING FUEL OIL NO. 2

Heating Fuel Oil No. 2 is very similar to kerosene but produces more smoke than K-1 and, therefore, is not appropriate for un-vented heaters.

9.3.1 FUEL USAGE

No. 2 Fuel Oil is the primary heating fuel for about 55.3% of the residential market. No. 2 Fuel Oil must be kept at moderate temperature for it to flow. Usually the basement is selected for fuel storage, although tanks are occasionally installed underground.

9.3.2 BLENDING COMPONENT

In the commercial sector, kerosene's primary usage in Delaware is as a blending component added to Diesel fuel to keep it flowing at winter temperatures. Typical Diesel fuel in the Winter may contain 35 to 50% kerosene, with blends upwards to 70% sometimes needed to compensate for the colder weather. Diesel fuel is used in the trucking and construction industries for mobile equipment. Diesel fuel is also used in some stationary plant installations for diesel generator-sets or other prime movers. In the residential sector, kerosene can be used to blend with No. 2 Fuel Oil for very cold weather.

Under less severe conditions, a "pour point depressant" can be added to heating oil. Pour point depressants reduce the temperature at which heating oil or diesel begins to congeal and are viable for most weather conditions. Under extremely cold weather, heating oil "clouds" or will

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

precipitate out waxes which will clog filters and orifices. There are no cloud point depressants, which leaves kerosene as the only viable blending component for extremely cold conditions.

Diesel powered trucks and equipment have an additional complication. They are not in fixed locations and are therefore subject to more variable temperatures.

9.4 Phase I - Monitor and Alert Activities – Heating/Kerosene Shortage		
Phase I - Monitor and Alert - Involves the normal ongoing energy supply, demand and price monitoring. State agencies regularly monitor data and information as it becomes available through energy supply reporting systems (see Appendix F on Monitoring Fuel Supplies) and pay special attention to supply and distribution problems. Activated when supply problems of natural gas are reported by the natural gas suppliers.		
Official Actions To Take:	Lead	Support
Conduct appropriate telephone surveys for seasonal propane supplies and prices. Communicate with a network of contacts in private and public sectors to monitor local conditions in the propane market.	ESF-12 Group DEO Gas Companies	Heating Oil Delivery Companies
Monitor media for local, national, and international events that might impact heating oil shortage supplies and prices in the State.	ESF-12 Group DEO	State Departments Local Media
Prepare to implement state government emergency conservation program.	ESF-12 Group DEO	State Departments Local Media
Prepare to implement reduced temperatures and operating procedures in state buildings and facilities.	ESF-12 Group DEO	State Departments Local Media
Prepare to request all building owners and operators to reduce building temperatures and operating conditions	ESF-12 Group DEO	Businesses DEMA Staff
Prepare to request employers to assist in heating oil conservation efforts by modifying working hours and building temperatures.	ESF-12 Group DEO	DEMA Staff
Notify all other agencies, associations, and companies that have roles in the SEERP, and other New England state energy offices of the escalation to Phase II.	ESF-12 Group DEO	DEMA Staff
If heating oil shortage increases, DEO and the DEMO Director may recommend to the Governor that the State escalate to Phase II. Notify all in-state and out-of-state agencies and companies of the escalation.	DEO DEMO Director ESF- 12 Group	DEMA Staff
Heating Oil Shortage Public Information Program		
DEMO PIO may provide information to newspapers and radio and television stations for consumers on how to conserve during a heating oil shortage. The public must be informed as to what it can do to voluntarily conserve heating oil. As staff deems certain mitigation measures appropriate, existing formatted public information announcements must be edited to describe the specific, current situation. The public will be notified of the situation and must be given specific voluntary conservation measures to implement. In order for the public to cooperate in conservation measures, it must be fully informed on the gravity of the situation and must be given specific instructions on the conservation measures it is requested to implement.	DEMO PIO	Local Media

9.5 Phase II - Assess and Determine Action – Heating Oil/Kerosene Shortage

Phase II - Assess and Determine Action - In Phase II, having noticed early signs of what might become an energy emergency, the responding agencies intensify data and information collection efforts and ensure that the most recent information is available. This information is analyzed to evaluate potential outcomes and assess possible courses of action.

- Appropriate contacts throughout state government should be informed of the results of this assessment.
- Appropriate action can then be determined. If no action is required, monitoring and evaluation continue and further updates are made as changes occur.

The Propane Phase II - Assess and Determine Action is activated when supply problems of heating oil, are reported by reliable sources such as the fuel retailers, distributors, and the terminals. The Verification Phase II may be activated if the DEO determines that a heating oil shortage is occurring or may shortly occur. During this phase, the DEO will: Rapidly determine the nature, extent, and duration of a potential, impending, or actual energy emergency. Coordinate energy emergency response activities with the DEMA, other appropriate state agencies, the U.S. Department of Energy, other state governments, local government agencies, and private industry. The DEO may provide a detailed Situation Report that assesses the potential or actual impacts of the emergency on energy prices and supplies. If required, use the informal fuels set-aside program to ensure that emergency and essential services receive adequate supplies of fuel. Recommend further actions (if any) to DEMA.

Official Actions To Take:	Lead	Support
Conduct appropriate telephone surveys for seasonal propane supplies and prices. Communicate with a network of contacts in private and public sectors to monitor local conditions in the propane market.	ESF-12 Group DEO Gas Companies	Heating oil Delivery Companies
Monitor media for local, national, and international events that might impact heating oil supplies and prices in the State.	ESF-12 Group DEO	State Departments Local Media
Prepare to implement state government emergency conservation program.	ESF-12 Group DEO	State Departments Local Media
Prepare to implement reduced temperatures and operating procedures in state buildings and facilities.	ESF-12 Group DEO	State Departments Local Media
Prepare to request all building owners and operators to reduce building temperatures and operating conditions	ESF-12 Group DEO	Businesses DEMA Staff
Prepare to request employers to assist in propane conservation efforts by modifying working hours and building temperatures.	ESF-12 Group DEO	DEMA Staff
Notify all other agencies, associations, and companies that have roles in the SEERP, and other New England state energy offices of the escalation to Phase II.	ESF-12 Group DEO	DEMA Staff
If propane fuel shortage increases, DEO and the DEMA Director may recommend to the Governor that the State escalate to Phase III. Notify all in-state and out-of-state agencies and companies of the escalation.	DEO DEMA Director ESF- 12 Group	DEMA Staff
If propane fuel shortage improves, the DEO and the DEMA Director may recommend to the Governor a de-escalation back to Phase I (normal conditions). Notify all in-state and out-of-state agencies and companies of the de-escalation.	DEO DEMA Director ESF- 12 Group	DEMA Staff

Heating Oil Shortage Public Information Program

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

DEMA PIO may provide information to newspapers and radio and television stations for consumers on how to conserve heating oil. The public must be informed as to what it can do to voluntarily conserve propane. As staff deems certain mitigation measures appropriate, existing formatted public information announcements must be edited to describe the specific, current situation. The public will be notified of the situation and must be given specific voluntary conservation measures to implement. In order for the public to cooperate in conservation measures, it must be fully informed on the gravity of the situation and must be given specific instructions on the conservation measures it is requested to implement.	DEMA PIO	Local Media
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9.7 Phase III - Actions and Feedback – Heating Oil Shortage

Phase III - Actions and Feedback - Once a decision has been made that specific state government action is necessary to assure the health, welfare, and safety of citizens, and the continued economic well-being of the State, Phase III activity begins. This includes:

- Implementing programs to maximize available supplies and/or to minimize existing demand levels and monitoring these activities to determine their effectiveness;
- Increasing the level of communication among state agencies and others;
- If the nature of the problem involves multiple states, information sharing among state energy coordinators, using the [EEAC](#) website, should begin; (the password-protected Energy Emergency Assurance Coordinators ([EEAC](#)) website through which authorized state energy emergency coordinators may access valuable energy security information, including daily news summaries, emergency situation reports, lessons learned from other states, links to outage and curtailment information, and the ability to email messages to colleagues in other jurisdictions). [more info](#)
- Convening emergency planning and response organizations to consider actions that might be taken by the various state departments and agencies;
- If implementation of voluntary programs or other emergency deterrent actions fail to mitigate the emergency, begin implementing additional actions;
- If the situation continues to deteriorate, recommending that a "State of Energy Emergency" be declared (usually by the Governor). The Governor may also be called upon to declare a "State of Disaster." State legislation regarding "State of Energy Emergency" and/or "State of Disaster" will dictate further action and assign responsibility among pertinent parties; and
- If it appears that all other options available to the State prove inadequate, the next level of mobilization is to request federal assistance.

Federal assistance would generally be available in the case of a national/international energy emergency; The emergency planning agencies and representatives from other state departments, as appropriate, would be responsible for coordinating and monitoring federal programs; Federal assistance may be requested sooner without a declaration of a national emergency to provide the following;

- Waiver federal driver hour requirements [more info](#);
- Waiver vehicle [fuel air quality standards](#);
- Request Coast Guard to intensify ice breaking (if Delaware River is frozen hampering barge movement; and Request [Strategic Petroleum Reserve \(SPR\)](#) or the [Northeast Heating Oil Reserves](#).

Official Actions To Take:	Lead	Support
Increase monitoring and analysis of heating oil stocks, product deliveries, consumption patterns and prices, including maintaining regular contact with suppliers and distributors regarding adequacy of propane product. Continue consultations and meetings with members of the propane industry.	DEMA Staff DEO ESF-12 Group	DEMA Staff

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Implement public information program and issue public appeals for voluntary conservation. See this section for heating oil conservation measures and formatted Propane Public Announcements.	DEMA Staff DEO ESF-12 Group	DEMA Staff
If propane fuel situation worsens, DEO and the DEMA Director may recommend to the Governor that the State escalate to Phase III. DEMA will notify all in-state and out-of-state agencies and companies of the escalation.	DEMA Staff DEO ESF-12 Group	DEMA Staff State Departments Schools & Businesses
If heating oil shortage is forecast to diminish and start to return to normal, DEO and the DEMA Director may recommend to the Governor a de-escalation back to Phase I. Notify all in-state and out-of-state agencies and companies of the de-escalation.	DEMA Staff DEO ESF-12 Group	DEMA Staff State Departments Schools & Businesses
During a severe or prolonged shortage of heating oil, it may be necessary to open temporary shelters for individuals or families that have run out of fuel.	DEMA PIO DEMA Staff	Red Cross Delaware VOAD
Heating Oil/Kerosene Shortage Public Information Program		
The same public information principles applicable to Phase II are also applicable to Phase III. The difference is that the situation is graver and more severe. In addition, the conservation measures imposed are mandatory. Public information announcements will convey non-alarming tone. They will be informative and not cause panic buying of product and hoarding. The public will be informed not only of the measures themselves, but also of the method of enforcing implementation of the conservation measures.	DEMA PIO DEMA Staff	Local Media DEMA Staff
The Governor requests, through DEMA and the media, voluntary conservation in residences by lowering thermostats or other controls to between 60 and 65 during the time the space is occupied during the day and evenings; between 55 and 60 at night; and to 50 in unoccupied facilities (see governor's press release Chapter 11).	DEMA PIO DEMA Staff	Local Media DEMA Staff
The public is carefully informed of the fully inform the public of the heating shortage and that the State is in Phase III. Public information announcements in must be extremely conscious of not being alarming in the tone of the announcements. They should be informative; but not cause panic buying of product and hoarding.	DEMA PIO DEMA Staff	Local Media DEMA Staff

9.7 Phase IV - Review Lessons Learned – Heating Oil/Kerosene Distribution Shortage

Phase IV - Review Lessons Learned - In Phase IV, As emergency operations are phased out, responding state agencies should evaluate the emergency preparedness programs and activities that were implemented and report the results to interested parties such as the Governor's Office, cabinet level officers, legislative committees and energy policy councils. Evaluation activities should include:

- Reports describing the nature of the energy emergency and a chronology of the actions taken to respond to it;
- Evaluation of mitigation actions results and of the effectiveness of specific actions taken to respond to the emergency; and
- Critical reviews of the overall performance of the State's energy emergency plans in addressing an emergency.
- It should be noted that movement from one phase to another is as much a matter of judgment as it is a matter of objective definition.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

9.8 Delaware Heating Oil and Kerosene Dealers					
<u>A & Vernon Service</u>	302-762-2969	510 Foulk Rd	Wilmington	DE	19803
Adams Oil Co	302-629-4531	N Pine St Ext	Seaford	DE	19973
B P Oil Inc Offices	302-629-8565	Milford Rd	Seaford	DE	19973
Budd Oil Co	302-738-6449	708 E Chestnut Hill Rd	Newark	DE	19713
Burge Inc Plumbing	302-378-9441	17 N Cox St	Middletown	DE	19709
Clements Supply Co Inc Hardware	302-653-8536	Main	Clayton	DE	19938
Delaware Oil Co	302-834-2073	2694 Pulaski Hwy	Delaware City	DE	19706
Delmarva Oil Inc	302-934-7882	101 William Dr	Millsboro	DE	19966
Durrell Sandblasting & Line Pa	302-836-1113	837 Salem Church Rd	Newark	DE	19702
Farrelly-Laurel Petroleum	302-875-7531	Central Ave	Laurel	DE	19956
Gooding Heating Service & Fuel	302-656-2751	813 E 8th St	Wilmington	DE	19801
Henderson Oil Co	302-368-2500	4 Brookhill Dr	Newark	DE	19702
Lloyd M H & Son Inc	302-629-4434	1405 Laurel Hwy	Seaford	DE	19973
Milford Mini Storage	302-422-9878	18 S Walnut St	Milford	DE	19963
Morris Oil Co	302-328-7635	3 Fithian Dr	New Castle	DE	19720
Premier Oil Co	302-654-6807	1829 W 8th St	Wilmington	DE	19805
Rain Dance Irrigation	302-366-1952	93 S Chapel St	Newark	DE	19711
Smokeys Gulf Service Inc	302-378-2451	48 E Main St	Middletown	DE	19709
Southern States Elkton Petroleum Service	302-366-1644	298 Whithill Rd	Newark	DE	19711
Watson Jesse F Fuel Oil	302-378-8264	5916 Summit Bridge Rd	Townsend	DE	19734
West End Fuel Inc	302-328-5151	1009 River Rd	New Castle	DE	19720
Wiley Fuel & Appliances	302-422-4497	18 S Walnut St	Milford	DE	19963
Z Best Fuel Oil	302-798-4024	2703 Wilson Ave	Claymont	DE	19703

CHAPTER 10 – COAL SHORTAGE EMERGENCY

10.1 BACKGROUND

Delaware's electricity generation capacity is among the lowest in the Nation. In recent years, coal-fired power plants have accounted for about three-fifths of electricity generation within the State, natural gas-fired plants have accounted for about one-fifth, and petroleum-fired plants have accounted for about one-tenth. Delaware receives its coal supplies primarily by rail from West Virginia, Kentucky, Colorado, and Virginia. More than one-fourth of Delaware households use electricity as their primary energy source for home heating.

10.2 DELAWARE COAL FIRED-PLANTS LEGISLATIVE ISSUES

On July 30, 2009, Governor Markell signed into law Senate Bills 59 and 106. **Senate Bill 59** creates new requirements for the state's building codes to increase energy efficiency and promotes the construction of zero-net-energy residential and commercial buildings. **Senate Bill 106**, titled the Energy Conservation and Efficiency Act of 2009, requires state utilities to reduce their energy consumption 15 percent by 2015. The legislation also identifies energy efficiency as the least expensive means of reaching Delaware's energy demands, and requires that efficiency efforts be considered before new supply is generated. The "loading order" for new generation calls for renewable energy sources to be used before fossil fuels.

Delaware currently produces minimal renewable energy, but plans to increase renewable energy generation are in development. In May 2009, the U.S. Department of the Interior approved Bluewater Wind to build two meteorological towers off the coasts of New Jersey and Rehoboth Beach, Delaware, that will allow the company to map weather patterns for determining the location of an offshore wind farm. In July 2007, Delaware expanded its renewable portfolio standard to require that 2 percent of the state's electricity be generated from solar photovoltaic sources in addition to 18 percent from other renewable sources by 2019.

Table 2. Delaware Ten Largest Plants by Generation Capacity, 2008			
Plant	Primary Energy Source or Technology	Operating Company	(MW) Net Summer Capacity
Delaware			
1. Hay Road	Gas	Conectiv Delmarva Gen Inc	1,090
2. Indian River Operations	Coal	Indian River Operations Inc	797
3. Edge Moor	Coal	Conectiv Delmarva Gen Inc	718
4. Delaware City Plant	Other Gases	The Premcor Refining Group Inc	307
5. McKee Run	Gas	NAES Corporation	136
6. NRG Energy Center Dover	Coal	NRG Energy Center Dover LLC	100
7. Warren F Sam Beasley Generation Station	Gas	Delaware Municipal Electric Corp	48
8. Christiana	Petroleum	Conectiv Delmarva Gen Inc	44
9. Van Sant Station	Gas	NAES Corporation	39
10. Seaford Delaware Plant	Coal	Invista	27
MW = Megawatt.			
Source: U.S. Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."			

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

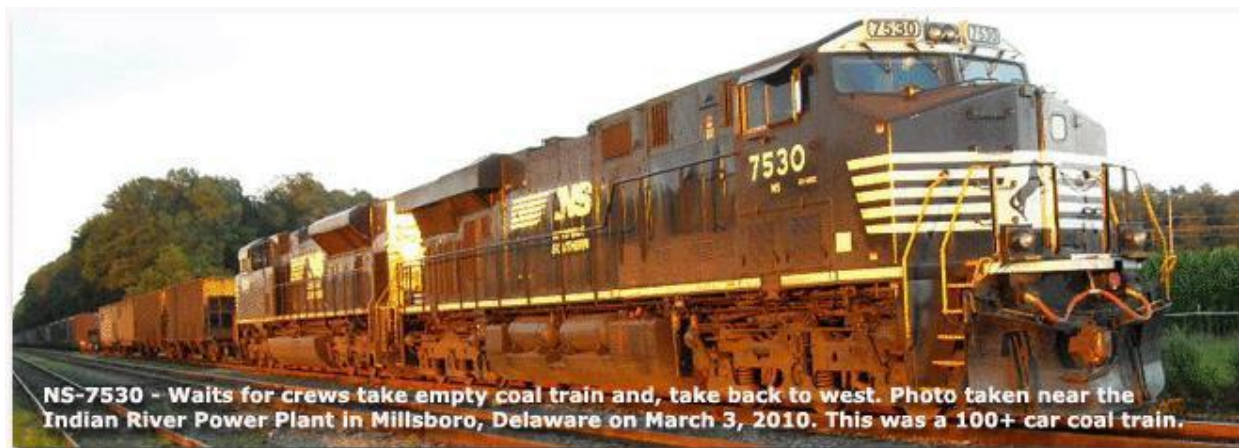
10.3 RAILROADS DELIVERING COAL TO POWER PLANTS IN DELAWARE

The Maryland and Delaware Railroad operates on three distinct segments of track throughout the Delmarva Peninsula. Each segment intersects the Norfolk Southern Railway.

The **Northern Line** intersects Norfolk Southern in Townsend, Delaware and heads west towards Massey, Maryland, where the line splits into two branches, one destined for Chestertown, Maryland and the other destined for Centreville, Maryland.

The **Seaford Line** intersects Norfolk Southern in Seaford, Delaware and continues west towards Cambridge, Maryland, passing through Federalsburg, Maryland and Hurlock, Maryland.

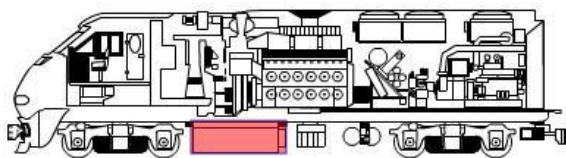
The **Snow Hill Line** intersects Norfolk Southern in Frankford, Delaware and continues south towards Snow Hill, Maryland.



The Locomotive Engine Details



The head-end power unit of a diesel locomotive consists of another big diesel engine, this time a four-stroke, twin-turbocharged Caterpillar V-12. The engine itself is more powerful than the engine in almost any semi-truck. It drives a generator that provides 480-volt, 3-phase AC power for the rest of the train. This engine and generator provide over 560 kW of electrical power to the rest of the train, to be used by the electric air conditioners, lights and kitchen facilities. By using a completely separate engine and generator for these systems, the train can keep the passengers comfortable even if the main engine fails. It also decreases the load on the main engine.



Diesel Locomotive Fuel Tank

This huge tank in the underbelly of the locomotive holds 2,200 gallons (8,328 L) of diesel fuel. The fuel tank is compartmentalized, so if any compartment is damaged or starts to leak, pumps can remove the fuel from that compartment. Recently, we've all seen the CSX commercials claiming their trains can carry one ton for 436 miles on only one gallon of fuel. If the

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

coal train runs low on diesel fuel, it can be refueled at any intersection using a bob-tail fuel truck (bob-tail truck capacity 4,500 gallons). To locate fuel haulers in Delaware go to: [Chapter-5-Motor-Fuel-Shortage-Emergency](#)

10.4 DELAWARE'S FOUR COAL-FIRED POWER PLANTS

[NRG](#) acquired the Dover Energy Center in 2000. The facility was built in 1985 by Kraft Foods to supply their adjacent food processing plant. Today it provides energy-efficient and environmentally sound steam from its combined heat and power plant. It also generates 16 MW of base-load and 88 MW peaking electrical energy from a pulverized coal fueled cogeneration unit and two 44 MW simple cycle gas turbine generator units at the Dover Cogeneration Plant. In addition to supplying the thermal steam needs of the Kraft plant, the facility also sells power into the Pennsylvania, New Jersey, and Maryland ([PJM](#)) market. Total energy output: 56 MWt (steam), 104 MW (electricity). Thermal energy purchaser: Kraft Foods Inc. and Procter & Gamble Company.



[NRG](#) acquired the Indian River Coal-Fired Generating Station in the summer of 2001 as part of a portfolio of projects from Delmarva Power and Light, a subsidiary of [Conectiv](#). Indian River is a 740 megawatt (MW) plant, enough to support approximately 600,000 homes, located in the southern Delaware town of Dagsboro on the banks of the Indian River. Base load capacity is provided by four coal-fueled units and a single combustion turbine that provides quick start peaking service, such as during extreme weather conditions. Since acquiring the plant, NRG has made significant investments towards improving the plant's environmental profile. Electricity generated at Indian River is sold to the regional transmission organization that manages the electric grid and the wholesale electricity market.\



INVISTA Seaford is one of the world's largest integrated producers of polymers and fibers, primarily for nylon, spandex and polyester applications. Invista bought [DuPont](#)'s textiles business for more than \$4 billion in 2004,^[1] including the [Invista Seaford Power Plant](#), which provides power to Invista's Seaford synthetic textiles manufacturing facility.



In April 2009 it was determined that INVISTA would pay a civil penalty of \$850,000 to EPA and a civil penalty of \$500,000 to Delaware for environmental violations found through audit at various INVISTA facilities, including the INVISTA-Seaford Plant. A Consent Decree was lodged in the U.S. District Court for the District of Delaware specifying corrective actions expected to result in net reductions in emissions from three boilers at the Seaford plant of 1,029 tons per year of nitrogen oxides; 4,211 tons per year of sulfur oxides; and 269 tons per year of particulate matter.

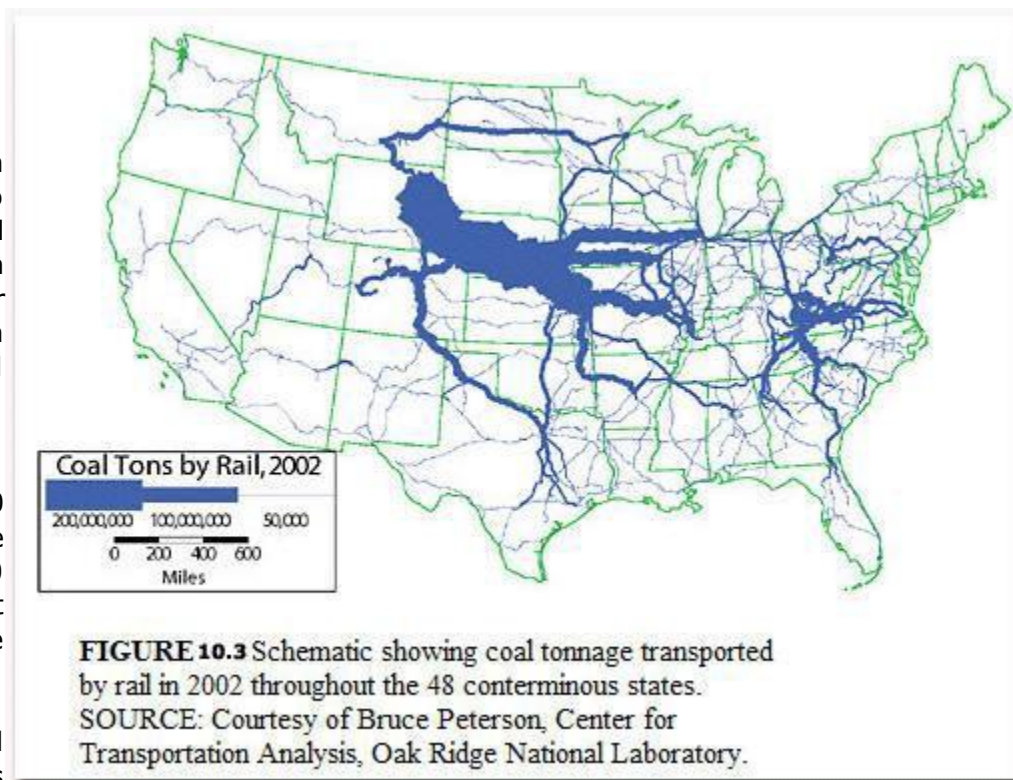
STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

The first two units at Edge Moor Power Plant were completed in 1951, and have since been retired. Currently in operation are units 3, 4, 5 and 10. Unit 3 began commercial operation in 1954; Unit 10 in 1963; Unit 4 in 1966; and Unit 5 in 1973. When the first units were brought online in 1951, Edge Moor Power Plant was the first major steam station in the Delmarva Power & Light electrical system. This plant was one of the first built with a fully centralized control system, which creates better operating efficiency and safety. Currently, the plant is installing state-of-the-art technologies to control emissions. The equipment is scheduled to be in commercial operation in early 2009. The plant also burns waste landfill gas produced at the Cherry Island Landfill in cooperation with the Delaware Solid Waste Authority. Unit 10 is a combustion turbine unit which uses low-sulfur diesel and is Black Start capable, meaning that when the whole system goes down (causing a Blackout), this unit can be used to bring the system back online. The unit can be started without needing a feed from a larger unit and in turn, can feed the power needed by larger units to re-start after a blackout ([Fact Sheet](#)).



10.5 What Can Go Wrong?

Like all fuels, coal must be transported to an end user before it can be used. Coal is typically transported over somewhat longer distances from mine to market, and coal mined in the Powder River Basin may travel distances ranging from less than 100 miles to more than 1,500 miles before it reaches the user. Therefore, growth in coal use depends on having sufficient



capacity to deliver increasing amounts of coal reliably and at reasonable prices. Conversely, insufficient capacity, insufficient confidence in reliable delivery, or excessive transportation prices could reduce or eliminate growth in coal use. The rail networks that transport the nation's coal—like air traffic control and electric transmission networks—have an inherent fragility and instability common to complex networks. Because concerns about

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

sabotage and terrorism were largely ignored until recently, existing networks were created with

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

potential choke points (see Figure 10.3) that cause vulnerability. The complex and dynamic interactions between societal and environmental factors—as well as the intrinsic dynamics of a system that operates close to its capacity—result in the potential for small-scale issues to become large-scale disruptions.

Weather and other natural phenomena, such as earthquakes, fires, and floods, have the potential to cause localized line outages that can, in turn, adversely affect an entire rail network. Weather conditions in Wyoming in May 2005 demonstrated this risk when heavy rain and snow, combined with accumulated coal dust in the roadbed, led to track instability on the Joint Line. Two coal trains derailed on consecutive days, damaging the line and temporarily putting it out of service (EIA, 2005b).

Both Union Pacific and BNSF declared *force majeure*, beginning with the derailments and continuing until normal operations were restored. Track maintenance and restoration disrupted operations and reduced shipments on the Joint Line throughout most of the rest of 2005 (UPC, 2006). The spot price of Powder River Basin 8,800 Btu (British thermal unit) coal reflected the severity



of this disruption, rising from \$8.19 per short ton just before the derailments to \$16.89 per short ton in October 2005 (EIA, 2005a, 2005c).

The terrorist attacks of September 11, 2001, and the more recent attacks on passenger transportation systems in London, Madrid, and Mumbai, have raised concerns about possible terrorist disruptions of freight rail transportation. Even when freight rail infrastructure is not directly the target of a terrorist attack, government efforts to protect against such attacks can slow trains, increase congestion, and adversely affect railroads' profitability, financial condition, or liquidity (UPC, 2006). The 2009 blizzard slowed coal delivery to power plants.

State utility regulators have noted increases in uncertainty associated with the availability of rail cars for loading the coal at its point of origin, the availability of locomotive power, and the arrival time at the train destination (NARUC, 2006). Opinions differ about whether or not disruptions in coal delivery reflect a substantial and ongoing problem and about whether the power plant operators or the railroads should modify their activities to respond to these delivery problems.

- Coal trains run low on fuel requiring refueling by fuel delivery trucks
- Coal piles become frozen, shortage of coal for power plants
- Know how many days of operation remains without a coal train.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012



See 10.6 below where the 2009 blizzard prevented the delivery of coal to power plants for several days. Photo center (above) shows trees across the track. The maintenance crew was behind the train that could not move.

10.6 Phase I - Monitor and Alert Activities - Coal Distribution Shortage

Phase I - Monitor and Alert - Involves the normal ongoing energy supply, demand and price monitoring. State agencies regularly monitor data and information as it becomes available through energy supply reporting systems ([see Appendix F on Monitoring Fuel Supplies](#)) and pay special attention to supply and distribution problems.

Activity	Lead Agency	Support Agency
Monitors international and domestic events	ESF-12 Group Energy Response Team Electric Utility Companies	DEMA Delaware Public Service Commission (PSC)
Train appropriate Delaware Energy Office staff.	ESF-12 Group Energy Response Team Electric Utility Companies	DEMA State Departments DEMA PIO
Attend exercises to establish and test emergency protocols.	ESF-12 Group Energy Response Team Electric Utility Companies	DEMAC State Departments DEMA PIO
Updates and maintains a network of public and private sector contacts. Prepares Internal memos.	ESF-12 Group Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO

10.7 Phase II - Assess and Determine Action - Coal Supply Shortage

Phase II - Assess and Determine Action - In Phase II, having noticed early signs of what might become an energy emergency; responding agencies intensify data and information collection efforts and ensure that the most recent information is available. This information is analyzed to evaluate potential outcomes and assess possible courses of action.

- Appropriate contacts throughout state government should be informed of the results of this assessment.
- Appropriate action can then be determined. If no action is required, monitoring and evaluation continue and further updates are made as changes occur.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Actions to Take:	Lead Agency	Support Agency
Communicate with a network of contacts in private and public sectors to monitor local conditions in the electricity supply and distribution market.	ESF-12 Group Energy Response Team Electric Utility Companies	DEMA EOC Delaware Public Service Commission (PSC)
Prepare to implement Delaware government electricity emergency conservation program.	ESF-12 Group Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
Prepare to implement reduced temperatures and operating procedures in state owned buildings and facilities.	ESF-12 Group Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
Prepare to request all building owners and operators to reduce building temperatures and operating conditions.	ESF-12 Group Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
Prepare to request employers to assist in electricity conservation efforts by modifying working hours and building temperatures.	ESF-12 Group Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
Notify all other agencies, associations, and companies that have roles in the ESF-12 plan of the escalation to Verification Phase I.	ESF-12 Group Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
If electricity shortage increases escalate to Pre-Emergency Phase III. Notify all city departments, agencies and companies of the escalation.	ESF-12 Group Energy Response Team Electric Utility Companies	DEMA EOC State Departments Private Business Agencies
If electricity shortage improves de-escalate back to normal conditions. Notify all agencies and companies of the de-escalation.	ESF-12 Group Energy Response Team Electric Utility Companies	DEMA EOC State Departments DEMA PIO
Coal Shortage Public Information Program		
The DEMA PIO will provide information to newspapers and radio and television stations for consumers on how to conserve electricity. The public must be informed as to what it can do to voluntarily conserve electricity. As staff deems certain mitigation measures appropriate, existing formatted public information announcements must be edited to describe the specific, current situation. The public will be apprised of the situation and must be given specific voluntary conservation measures to implement. In order for the public to cooperate in conservation measures, it must be fully informed on the gravity of the situation and must be given specific instructions on the conservation measures it is requested to implement.	ESF-12 Group Delaware Energy Response Team Electric Utility Companies DEMA PIO	DEMA EOC State Departments DEMA PIO

10.8 Phase III - Actions and Feedback - Coal Supply Shortage

Phase III - Actions and Feedback - Once a decision has been made that specific state government action is necessary to assure the health, welfare, and safety of citizens, and the continued economic well-being of the state, Phase III activity begins. This includes:

- Implementing programs to maximize available supplies and/or to minimize existing demand levels and monitoring these activities to determine their effectiveness;
- Increasing the level of communication among state agencies and others;
- If the nature of the problem involves multiple states, information sharing among state energy coordinators, using the [EEAC](#) website, should begin; (the password-protected Energy Emergency Assurance Coordinators ([EEAC](#)) website through which authorized state energy emergency coordinators may access valuable energy security information, including daily news summaries, emergency situation reports, lessons learned from other states, links to outage and curtailment information, and the ability to email messages to colleagues in other jurisdictions). [more info](#)
- Convening emergency planning and response organizations to consider actions that might be taken by the various state departments and agencies;
- If implementation of voluntary programs or other emergency deterrent actions fail to mitigate the emergency, begin implementing additional actions;
- If the situation continues to deteriorate, recommending that a –State of Energy Emergencyll be declared (usually by the Governor). The Governor may also be called upon to declare a –State of Disaster.ll State legislation regarding –State of Energy Emergencyll and/or –State of Disasterll will dictate further action and assign responsibility among pertinent parties; and
- If it appears that all other options available to the state prove inadequate, the next level of mobilization is to request federal assistance.

Federal assistance would generally be available in the case of a national/international energy emergency; The emergency planning agencies and representatives from other state departments, as appropriate, would be responsible for coordinating and monitoring federal programs; Federal assistance may be requested sooner without a declaration of a national emergency to provide the following;

- Waiver federal driver hour requirements [more info](#);
- Waiver vehicle [fuel air quality standards](#);

Request Coast Guard to intensify ice breaking (if Delaware River is frozen hampering barge movement; and Request [Strategic Petroleum Reserve \(SPR\)](#) or the [Northeast Heating Oil Reserves](#).

Implement public information program and issue public appeals for voluntary electricity conservation.	ESF-12 GROUP Energy Response Team Electric Utility Companies	DEMA EOC Delaware Public Service Commission (PSC)
Implement state energy emergency conservation program. Advise state departments to alter temperature and operating conditions in city buildings and facilities.	ESF-12 GROUP Energy Response Team Electric Utility COMPANIES	State Departments City/County Agencies

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

If electricity shortage worsens escalate to Emergency Phase IV. DEMA will notify all agencies and companies of the escalation.	ESF-12 GROUP Energy Response Team Electric Utility Companies	State Departments City/County Agencies
If electricity shortage is forecast to diminish and start to return to normal order a de-escalation back to Readiness Phase I. Notify all agencies and companies of the de-escalation.	<i>ESF-12 GROUP</i> Delaware Energy Response Team Electric Utility Companies	State Departments City/County Agencies
Implement state energy emergency conservation program. Advise state departments to alter temperature and operating conditions in city buildings and facilities.	<i>ESF-12 GROUP</i> Delaware Energy Response Team Electric Utility COMPANIES	State Departments City/County Agencies
If electricity shortage worsens escalate to Emergency Phase IV . DEMA will notify all agencies and companies of the escalation.	<i>ESF-12 GROUP</i> Delaware Energy Response Team Electric Utility Companies	State Departments City/County Agencies
If electricity shortage is forecast to diminish and start to return to normal order a de-escalation back to Readiness Phase I . Notify all agencies and companies of the de-escalation.	<i>ESF-12 GROUP</i> Delaware Energy Response Team Electric Utility Companies	State Departments City/County Agencies
Coal Shortage Public Information Program		
The same public information principles applicable to Phase II are also applicable to Phase III. Public information announcements will convey non-alarming tone. They will be informative and not cause panic buying of products and hoarding	ESF-12 Group Delaware Energy Response Team Electric Utility Companies DEMA PIO	Local Media
The DEMA PIO will provide information to consumers through newspapers and radio and television stations on how to conserve electricity. As staff deems certain mitigation measures appropriate, existing formatted public information announcements must be edited to describe the specific, current situation.	ESF-12 Group Delaware Energy Response Team Electric Utility Companies DEMA PIO	Local Media
10.8 Phase IV - Review Lessons Learned – Coal Shortage Emergency		
<p>Phase IV - Review Lessons Learned - In Phase IV, As emergency operations are phased out, responding state agencies should evaluate the emergency preparedness programs and activities that were implemented and report the results to interested parties such as the Governor's Office, cabinet level officers, legislative committees and energy policy councils. Evaluation activities should include:</p> <ul style="list-style-type: none"> • Reports describing the nature of the energy emergency and a chronology of the actions taken to respond to it; • Evaluation of mitigation actions results and of the effectiveness of specific actions taken to respond to the emergency; and • Critical reviews of the overall performance of the State's energy emergency plans in addressing an emergency. • It should be noted that movement from one phase to another is as much a matter of judgment as it is a matter of objective definition. 		

CHAPTER 11 – DELAWARE AVIATION FUEL SHORTAGE EMERGENCY

11.1 DELAWARE'S AIRPORT BACKGROUND

Most of Delaware's 11 public use aviation facilities concentrate on business and recreational flights by individual or corporate owners. In recent years, New Castle Airport accounted for almost half of the non-military flight activity in the state, and up to 63% of the flights were private business-related. Most commercial passengers continue to fly out of nearby Philadelphia International Airport or Baltimore-Washington International Airport. The Delaware Airport Plan has been updated ([click here to view DELDOT plan](#))



The majority of aviation facilities in Delaware are private airports, but New Castle Airport, Sussex County Airport, Delaware Airpark, and the Dover Air Force Base Civil Air Terminal are publicly-owned aviation facilities. DELDOT has recently purchased the Delaware Airpark near Cheswold, just north of Dover, and has also upgraded aircraft parking at the Dover Air Force Base Civil Air Terminal to provide easier access to the civilian public. The Delaware River and Bay Authority operates the New Castle Airport, Delaware Airpark, and the Civil Air Terminal. As of September 11, 2001, the Civil Air Terminal is closed indefinitely due to security concerns.



11.2 NEW CASTLE AIRPORT

The New Castle Airport is the largest civilian airport in the state, with two runways over 7,000 feet long and facilities that cover 1,100 acres. The airport includes significant hangar and aviation-related business rental space, as well as a flight school, aircraft rentals, and repair services. The Delaware River and Bay Authority manages this airport.

11.3 DOVER AIR FORCE BASE

This U.S. military base is the largest aerial port facility on the East Coast, and it is an important part of the economy of Kent County. The base houses C-5 transport planes that play a major role in overseas military and humanitarian support operations.

11.3.1 DOVER AFB CIVIL AIR TERMINAL

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

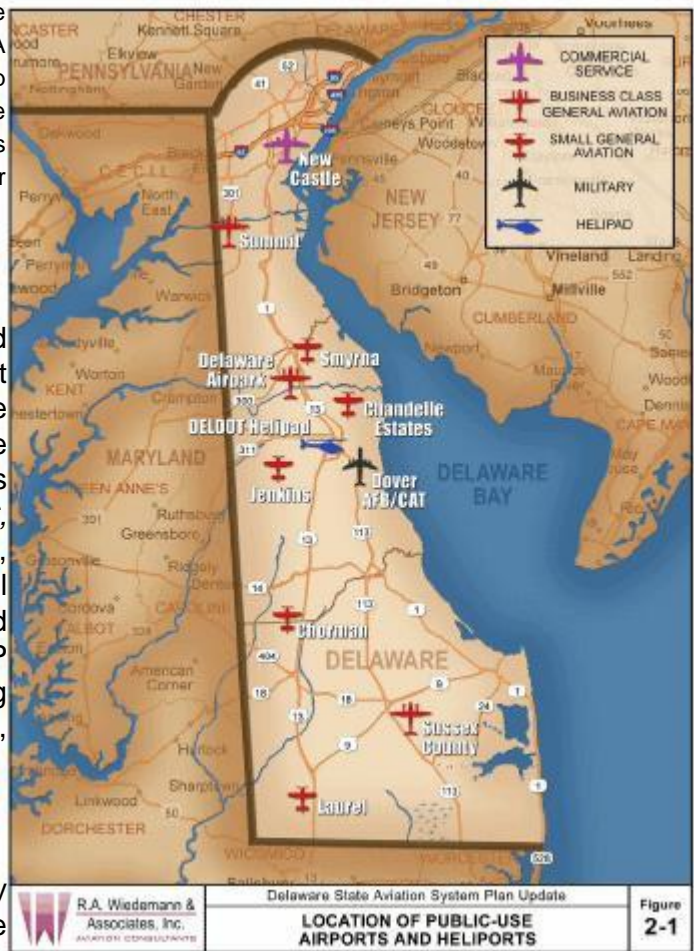
A joint use agreement between the base and the Department of Transportation allows private aircraft to use an adjacent civil air terminal. A recent improvement has increased the paved ramp area from one-half acre to 6.5 acres. The Delaware River & Bay Authority operates this facility. The CAT has been closed to civilian air traffic until further notice due to military security.

11.4 SUSSEX COUNTY AIRPORT

Sussex County Airport is owned and operated by the county and is located just east of Georgetown, the county seat. The airport serves general aviation, corporate aviation, military, and state police. It is home to the installation facility for PATS, Inc. of Columbia, MD. PATS designs, manufactures, and installs auxiliary fuel tanks, flight deck instrumentation, and other equipment for the commercial, VIP and corporate aircraft market, including Boeing Business Jet, Bombardier, Raytheon, Cessna, and Gulfstream.

11.5 DELAWARE AIRPARK

DELDOT recently purchased this facility in Cheswold, which is operated by the Delaware Bay Authority. The airport features a 3,582-foot-long by 50-foot-wide runway system and is the only publicly-owned general aviation airport in Kent County. The airport serves general aviation, corporate aviation, and the Delaware State University aviation flight training program.



11.6 AVIATION FUEL SYSTEM DESCRIPTION

Aviation fuels, both aviation gasoline and jet fuels, are refined petroleum products and are supplied to Delaware by the same supply and distribution system that applies to all petroleum products entering the state for retail and wholesale distribution. Some refined oil is transported by ship into the gulf region. Additionally, oil enters the region by pipeline, rail tanker car, and by truck.

An aviation fuel emergency could occur due to a disruption in the supply system to include a mix of the following factors:

- The unloading facilities and/or other marine transport facilities become inaccessible due to hurricanes, severe winds, or ship accident in the channels.
- Delaware has one operating refinery. Some of the fuel is used at local airports. However, when local aviation unloading facilities become inoperable due to weather or accident it may not be available.
- Local truck transport becomes constrained due to ice or snow.



STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- Shortage due to labor strikes.
- Extended cold snap combined with just-in-time inventory management.
- Product shortage due to high export rate.
- Imports reduced for political or economic reasons.
- A supply and demand imbalance.

11.7 Airports in Delaware

ID #	Location	Name	ID #	Location	Name
0N4	Dover	Chandelle Estates Airport	N06	Laurel	Laurel Airport
0N5	Dover	DELDOT Helistop	KEVY	Middletown	Summit Airport
33N	Dover Cheswold	Delaware Airpark	38N	Smyrna	Smyrna Airport
D74	Farmington	Chorman Airport	KILG	Wilmington	New Castle County Airport
0N6	Felton	Henderson Aviation Airport	15N		Jenkins Airport
KGED	Georgetown	Sussex County Airport			
Source: http://www.airnav.com/airports/state/DE.html					

11.8 Phase I - Monitor and Alert	Lead	Support
<p>Phase I involves the normal ongoing energy supply, demand and price monitoring. State agencies regularly monitor data and information as it becomes available through energy supply reporting systems (see Appendix D on Supply Monitoring) and pay special attention to supply and distribution problems.</p> <p>The Energy Response Team monitors aviation fuel prices and quantities. Energy Response Team stores this data in the in the fuel suppliers database. If aviation fuels monitoring activities indicate a possible severe aviation fuels price escalation or shortage of aviation fuels product, notify Energy Response Team of activity.</p>	Energy Response Team	Staff
11.9 Phase II - Assess and Determine Action	Lead	Support
<p>In Phase II, having noticed early signs of what might become an energy emergency, responding agencies intensify data and information collection efforts and ensure that the most recent information is available. This information is analyzed to evaluate potential outcomes and assess possible courses of action. Contacts throughout state government should be informed of the results of this assessment.</p> <ul style="list-style-type: none"> ▪ Appropriate action can then be determined. If no action is required, 	Energy Response Team	Staff

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

<p>monitoring and evaluation continue and further updates are made as changes occur.</p> <ul style="list-style-type: none"> ▪ The Energy Response Team, upon notification by a supplier or airport manager of a problem, recommends the Governor declare an escalation to Pre-Emergency Phase II. Energy Response Team will notify all other appropriate agencies, associations, and companies that have roles in the SEAP. ▪ The Energy Response Team monitors aviation fuel prices and quantities. Energy Response Team stores this data in the in the fuel suppliers database. ▪ If aviation fuels monitoring activities indicate a possible severe aviation fuels price escalation or shortage of aviation fuels product, notify Energy Response Team of activity. ▪ The Energy Response Team, upon notification by a supplier or airport manager of a problem, recommends the Governor declare an escalation to Pre-Emergency Phase II. Energy Response Team will notify all other appropriate agencies, associations, and companies that have roles in the SEAP. 		
11.10 Phase III - Actions and Feedback	Lead	Support
The Energy Response Team will continue to conduct surveys of aviation fuels prices and inventories. Assist the Governor in determination of existence of an energy emergency and the determination of a possible issuance of the Governor's declaration of emergency.	Energy Response Team Governor	Energy Response Team Staff
The Energy Response Team will increase monitoring and analysis of aviation fuels stocks, product deliveries, consumption patterns, and prices, including maintaining regular contact with suppliers and distributors regarding adequacy of available product.	Energy Response Team	Energy Response Team Staff
The Energy Response Team will convene a meeting of representatives of aviation fuels suppliers and distributors to assess the causes, probable duration, and geographic extent of the shortage and the steps providers can take to alleviate or avert a shortage.	Energy Response Team	Fuel Suppliers
The Energy Response Team, in coordination with the DEMA, prepares public information program to explain situation to the aviation fuel users and ask for voluntary conservation of aviation fuels.	Energy Response Team	DEMA PIO

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

<p>If aviation fuels situation worsens, the Energy Response Team will recommend to the governor that the state escalate to Emergency Phase III. The Energy Response Team will notify all in-state and out-of-state agencies and companies of the escalation.</p> <p>When the aviation fuels shortage improves, the Energy Response Team will recommend to the governor de-escalation back to Verification Phase II. Notify all in-state and out-of-state agencies and companies of the de-escalation.</p> <ul style="list-style-type: none"> ▪ Implementing programs to maximize available supplies and/or to minimize existing demand levels and monitoring these activities to determine their effectiveness; ▪ Increasing the level of communication among state agencies and others; ▪ If the nature of the problem involves multiple states, information sharing among state energy coordinators, using the EEAC website, should begin; ▪ Convening emergency planning and response organizations (DEMA, Energy Response Team, PSC) to consider actions that might be taken by the various state departments and agencies; ▪ If implementation of voluntary programs or other emergency deterrent actions fail to mitigate the emergency, begin implementing additional actions; ▪ If the situation continues to deteriorate, recommending that a "State of Energy Emergency" be declared (usually by the Governor). The Governor may also be called upon to declare a "State of Disaster." State legislation regarding "State of Energy Emergency" and/or "State of Disaster" will dictate further action and assign responsibility among pertinent parties; and ▪ If it appears that all other options available to the state prove inadequate, the next level of mobilization is to request federal assistance. ▪ Federal assistance would generally be available in the case of a national/international energy emergency; ▪ The emergency planning agencies and representatives from other state departments, as appropriate, would be responsible for coordinating and monitoring federal programs; ▪ Federal assistance may be requested sooner without a declaration of a national emergency to provide the following; <ul style="list-style-type: none"> Waiver federal driver hour requirements; <ul style="list-style-type: none"> ○ Waiver vehicle fuel air quality standards; ○ Request Coast Guard to intensify ice breaking; and ○ Request Strategic Petroleum Reserve (SPR) or the Northeast Heating Oil Reserves. 	<p>Energy Response Team</p>	<p>DEMA PIO</p>
<h3>11.11 Phase IV - Review Lessons Learned</h3>		
<p>As emergency operations are phased out, responding state agencies should evaluate the emergency preparedness programs and activities that were implemented and report the results to interested parties such as the Governor's Office, cabinet level officers, legislative committees and energy policy councils. Evaluation activities should include:</p>		

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- Reports describing the nature of the energy emergency and a chronology of the actions taken to respond to it;
- Evaluation of mitigation actions results and of the effectiveness of specific actions taken to respond to the emergency; and
- Critical reviews of the overall performance of the state's energy emergency plans in addressing an emergency. It should be noted that movement from one phase to another is as much a matter of judgment as it is a matter of objective.

CHAPTER 12 – PIPELINE – DISTRIBUTION SHORTAGE EMERGENCIES

12.1 WHAT MAKES UP THE PIPELINE NETWORK?

The pipeline network is an intricate transportation system, made up of about 1.5 million miles of mainline and other pipelines, links production areas and natural gas markets. The U.S. natural gas transportation network delivered more than 23 trillion cubic feet of natural gas during 2008 to about 70 million customers.

Transporting natural gas from the production field to the consumer involves a series of steps, generally carried out in order:

- Gathering systems, primarily made up of small-diameter, low-pressure pipelines move raw natural gas from the wellhead to a natural gas processing plant or to an interconnection with a larger mainline pipeline.
- Processing plants separate natural gas liquids and impurities from the natural gas stream before the natural gas is delivered into a mainline transmission system.
- About 306,000 miles of wide-diameter, high-pressure interstate and intrastate transmission pipelines transport natural gas from the producing area to market areas. Compressor stations (or pumping stations), located strategically along the length of the pipeline network, keep the natural gas flowing forward along the pipeline system. More than 200 companies operate mainline transmission pipelines.
- Underground storage facilities, fashioned from depleted oil, natural gas, or aquifer reservoirs or salt caverns, are used to store natural gas as a seasonal backup supply. In 2007, about 125 natural gas storage operators managed roughly 400 active storage fields. When needed, this reserve is withdrawn to meet additional customer demand during peak usage periods. Aboveground liquefied natural gas storage facilities are also used for this purpose. More than 200 companies operate
- More than 1,300 local distribution companies deliver natural gas to end users through hundreds of thousands of miles of small-diameter service lines. Local distribution companies reduce the pressure of the natural gas received from the high-pressure mainline transmission system to a level that is acceptable for use in residences and commercial establishments.



Customers in more than half of the Lower 48 States are totally dependent upon the interstate natural gas pipeline system to supply their natural gas needs. About 142,000 miles of the current 306,000 miles of the mainline natural gas transmission network were installed in the 1950s and 1960s as consumer demand for low-priced natural gas more than doubled following World War II. In fact, about half of the natural gas pipeline mileage currently installed in Texas and Louisiana, two of the largest natural gas production areas in the country, was constructed between 1950 and 1969. By the close of 1969, marketed natural gas production exceeded 20 trillion cubic feet for the first time.

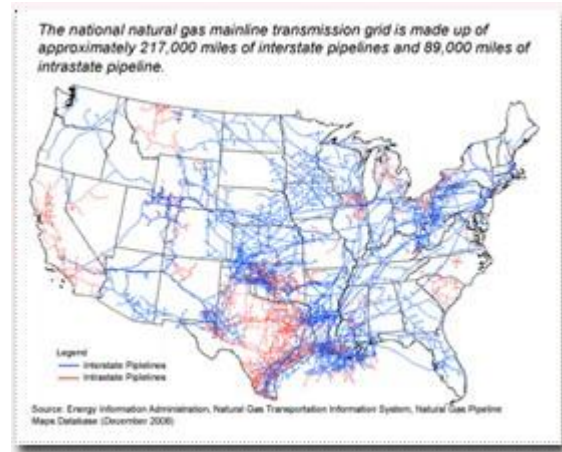
A large portion of the 1.2 million miles of local distribution pipelines, which receive natural gas from the mainline transmission grid and deliver it to consumers, was also installed during the same period. However, the period of greatest local distribution pipeline growth has been more recent. In the 1990s, more than 225,000 miles of new local distribution lines were installed to

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

provide service to the many new commercial facilities and housing developments that wanted access to natural gas supplies during that period of economic growth.

The demand for natural gas has grown in recent years in part because it is considered a relatively environmentally-friendly energy source. Its use as an electric power generation fuel also has grown steadily with a decline in the capital costs of producing electric power from natural gas as technology in the area has improved.

Natural gas prices, along with oil prices, increased substantially between 2003 and 2008. Higher prices gave natural gas producers the incentive to expand development of new natural gas fields. Consequently, new pipelines have been and are being built to link these new production sources to the existing mainline transmission network. Construction of new transmission and local distribution mainline pipeline mileage during the current decade, 2000-2009, is projected to surpass that of any other decade since the 1950s.



Liquefied natural gas (LNG) is natural gas that has been cooled to about -260°F for shipment and/or storage as a liquid. The volume of the liquid is about 600 times smaller than in its gaseous form. In this compact form, natural gas can be shipped in special tankers to receiving terminals in the United States and other importing countries. At these terminals, the LNG is returned to a gaseous form and transported by pipeline to distribution companies, industrial consumers, and power plants.

Liquefying natural gas provides a means of moving it long distances where pipeline transport is not feasible, allowing access to natural gas from regions with vast production potential that are too distant from end-use markets to be connected by pipeline.

Petroleum products are supplied to Delaware by the same supply and distribution system that applies to all petroleum products entering the State for retail and wholesale distribution. Some refined oil is transported by ship into the gulf region. Additionally, oil enters the region by pipeline, rail tanker car, and by truck. A pipeline energy emergency shortage could occur due to a disruption in the supply system to include a mix of the following factors:

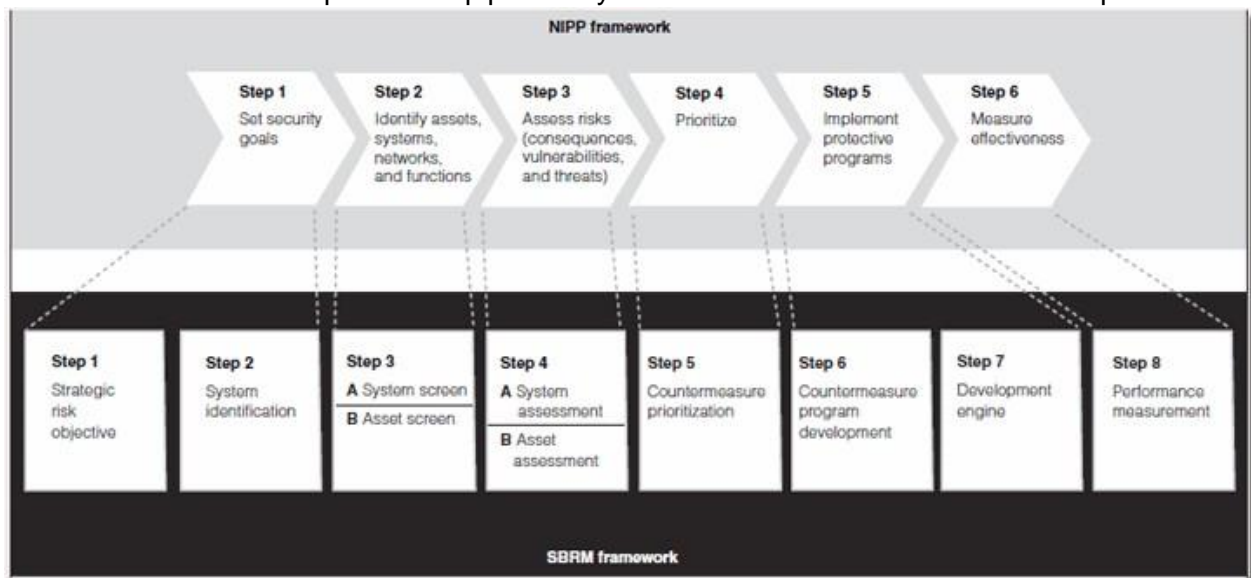
- The unloading facilities and/or other marine transport facilities become inaccessible due to hurricanes, severe winds, or ship accident in the channels.
- Local truck transport becomes constrained due to ice or snow.
- Shortage due to labor strikes.
- Extended cold snap combined with just-in-time inventory management.
- Product shortage due to high export rate.
- Imports reduced for political or economic reasons.
- Supply and demand imbalance.

2.2 PIPELINES - WHAT CAN GO WRONG?

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

As required by Executive Order 13416, the Pipeline Modal Annex implements the Transportation Sector Specific Plan ([TSSP](#)) and was developed to ensure the security and resiliency of the pipeline sector. The vision of this plan is to ensure that the pipeline sector is secure, resilient, and able to quickly detect physical and cyber intrusion or attack, mitigate the adverse consequences of an incident, and quickly restore pipeline service (The Pipeline Manual was Developed for Response).. The [TSSP](#) and the [Pipeline Modal Annex](#) were developed, reviewed, and updated using both the Transportation Sector and the [Energy Sector Government Coordinating Council \(GCC\)](#) and Sector Coordinating Council (SCC) frameworks. In accordance with the National Infrastructure Protection Plan (NIPP), a [Critical Infrastructure Partnership Advisory Council \(CIPAC\) Oil and Natural Gas \(ONG\)](#) Joint Sector Committee was established to provide a legal framework for members of the Energy Sector [GCC](#) and [ONG SCC](#) to engage in joint critical infrastructure protection discussions and activities, including those involved with pipeline security. Under this [CIPAC](#) committee, a Pipeline Working Group writing team was formed to develop and review applicable [Sector-Specific Plans \(SSPs\)](#), including the [Energy SSP](#) and the [TSSP](#). The writing team reviewed and commented on the draft [Pipeline Modal Annex](#) Base Plan and drafted the [Pipeline Modal Annex](#). The draft plans were distributed to the pipeline industry via the [GCC](#) and [SCC](#) memberships for another level of review and input before finalizing the documents.

- The core of the plan is a pipeline system relative risk assessment and prioritization



methodology. This methodology provides a logical prioritization process to systematically list, analyze and sort pipeline systems and critical pipeline components within those pipeline systems. By prioritization, security resources can be effectively used to manage risk mitigation in order to protect critical pipelines from terrorist threats. The methodology is based on the Transportation Sector Systems-Based Risk Management (SBRM)



STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

methodology, which is in turn based on the Risk Management Framework presented in the NIPP. With a view toward this end-state, the [TSSP](#) and this Pipeline Modal Annex specifically focus on how the Transportation Sector will continue to enhance the security of its critical infrastructure and key resources. Programs to protect the Nation's Pipeline System (s) are making the nation safer, more secure, and more resilient in the face of terrorist attacks and other hazards.

12.3 - TYPES OF PIPELINES

Pipeline Systems: Oil- 177,000 miles; 623 billion ton-miles; Natural Gas- 1.3 million miles of pipeline.

1. Natural Gas Transmission and Storage. These lines are mostly interstate, transporting natural gas over 310,000 miles of pipelines from sources to communities, operated by more than 700 operators. More than 400 natural gas storage facilities are in the United States.
2. Hazardous Liquid Pipelines and Tanks. These pipelines predominately consist of interstate pipelines transporting crude oil to refineries and refined petroleum products (e.g., fuels) to marketing terminals and airports; they carry diesel fuel, gasoline, jet fuel, anhydrous ammonia, and carbon dioxide to product terminals and airports. Nationwide, there are about 160,000 miles of these pipelines in operation, operated by more than 200 operators.
3. Natural Gas Distribution. These are typically local distribution company pipelines, mostly intrastate, that transport natural gas from transmission pipelines to residential, commercial, and industrial customers. Included in this segment of the industry are the local distribution companies, i.e., natural gas utilities. More than 1,300 operators operated approximately 1.9 million miles of natural gas distribution pipelines nationwide.
4. Liquefied Natural Gas (LNG) Processing and Storage Facilities. More than 104 facilities nationwide either directly receive LNG from tank ship or truck or receive natural gas via pipeline for processing (liquefying) into LNG and then store it on site in specialized tanks. When needed, LNG is vaporized for injection into natural gas pipeline systems.

12.4 [THREATS TO PIPELINES](#)

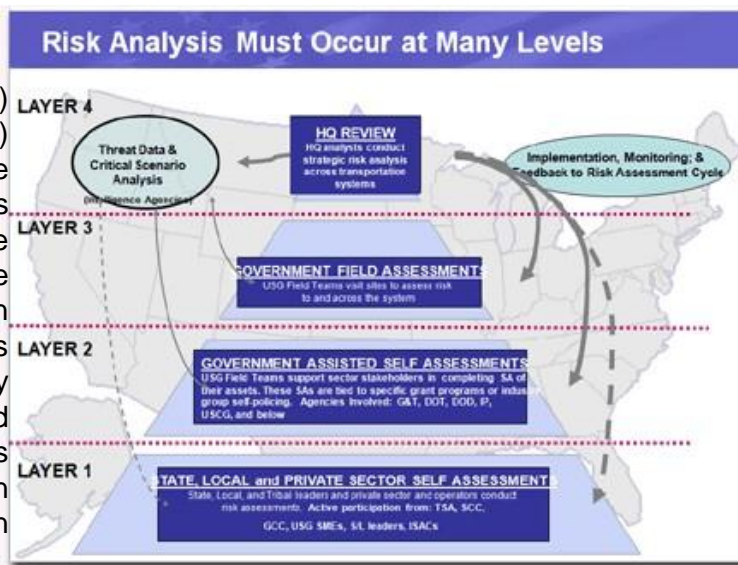
Oil and gas pipelines have been a favored target of terrorists outside the United States. While there is no specific credible reporting to date indicating that similar attacks will occur in the United States, the fact that terrorist groups have demonstrated the capability and intent to attack pipeline systems abroad raises the possibility that similar attacks could occur inside the homeland.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

12.5 GOVERNMENT COORDINATING COUNCIL (GCC) AND SECTOR COORDINATING COUNCIL (SCC) STRUCTURE AND PROCESS

A Pipeline Working Group has been established to address pipeline issues within the Energy Sector Government Coordination Council (GCC). Each of the transportation modes is required to have a GCC. To avoid duplication and eliminate the need for multiple meetings with the same security partners, the Energy Sector GCC Pipeline Working Group also acts as the Pipeline GCC for the Transportation Sector GCC.

The Oil and Natural Gas (ONG) Sector Coordinating Council (SCC) has also established a Pipeline Working Group to address pipeline issues. The ONG SCC Pipeline Working Group also acts as the Pipeline SCC for the Transportation SCC. TSA Pipeline Security has been a member of the Energy Sector GCC since its inception, and the Department of Energy (DOE) is a member of the Transportation Sector GCC as well. More details on the Energy Sector GCC and ONG SCC can be found in the Energy Sector-Specific Plan.



12.6 FEDERAL AGENCIES RESPONSIBLE FOR PIPELINES

Under the NIPP, the TSA is assigned as a Sector-Specific Agency (SSA) for the Transportation Sector, including the pipeline systems mode. The U.S. Coast Guard is the SSA for the Transportation Sector maritime mode. SSAs are responsible for coordinating infrastructure protection activities within the critical infrastructure sectors. DOE is the SSA for the Energy Sector and therefore works closely with TSA on pipeline security issues, programs, and activities. DOT is responsible for administering a national program of safety in natural gas and hazardous liquid pipeline transportation, and TSA and DOT coordinate on matters relating to transportation security and transportation infrastructure protection. The Department of Justice (DOJ) through the FBI is responsible for investigating and prosecuting actual or attempted attacks on, sabotage of, or disruptions of CI/KR in collaboration with DHS.

12.7 INFORMATION SHARING

A number of methods have been employed and will continue to be used to foster good communication and information sharing within the pipeline mode.

GCC/SCC/CIPAC Framework - The GCC/SCC/CIPAC framework has been and will continue to be used to facilitate discussion and information sharing among pipeline security partners.

TSA Pipeline Security Stakeholder Conference Calls - Since March 2006, TSA has conducted regular conference calls with pipeline security partners. These conference calls are used to share pipeline security information and educate security partners on many of the programs, activities, and initiatives within the pipeline mode or within the Transportation Sector. These conference calls also provide pipeline security partners with the opportunity to ask questions and bring up other important issues for discussion. Unscheduled stakeholder conference calls can be conducted on short notice as the need arises.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Trade Associations - As appropriate, information is also disseminated through five major trade associations with strong ties to the pipeline industry: API, AOPL, INGAA, AGA, and APGA. These associations can quickly pass information to their member companies, as demonstrated by the numerous conference call information sharing sessions conducted with their respective security committees over the past 5 years.

Homeland Security Information Network (HSIN) - HSIN is an Internet-based communications system DHS established to facilitate exchanging information between DHS and other government, private sector, and non-governmental organizations involved in antiterrorism and incident management activities. In May 2006, the ONG SCC signed a Memorandum of Understanding (MOU) with DHS to establish the ONG HSIN. Efforts are underway to incorporate pipeline security communications and information

[Transportation Sector-Specific Plan](#)

[Pipeline Modal Annex](#)

12.8 FEDERAL ENERGY REGULATORY COMMISSION (FERC) PIPELINE ENGINEERING DATA AND DAMAGE

Reporting - The FERC has taken steps to provide relevant engineering data that it receives from jurisdictional interstate pipelines in the context of location siting and permitting to the DOE. In June 2006, the FERC also revised its regulations to require jurisdictional pipelines to report major damage to pipeline systems that result from major disasters, whether they are natural (such as a hurricane) or manmade (such as a terrorist attack). This revision was made, in part, to enhance its ability to provide relevant information to GCC and SCC activities.

12.9 Phase I - Monitor and Alert Activities - Pipeline Distribution Shortage		
Phase I - Monitor and Alert - Involves the normal ongoing energy supply, demand and price monitoring. State agencies regularly monitor data and information as it becomes available through energy supply reporting systems (see Appendix F on Monitoring Fuel Supplies) and pay special attention to supply and distribution problems.		
Responders Actions to Be Taken:	Lead Agency	Support Agency
The Energy Response Team and DEMA monitor pipeline problems. Energy Response Team stores this data in the in the fuel suppliers database.	Energy Response Team	DEMA
If aviation fuels monitoring activities indicate a possible severe aviation fuels price escalation or shortage of aviation fuels product, notify Energy Response Team of activity.	Energy Response Team	DEMA
The Energy Response Team, upon notification by a supplier or airport manager of a problem, recommends the Governor declare an escalation to Pre-Emergency Phase II. Energy Response Team will notify all other appropriate agencies, associations, and companies that have roles in the SEAP.	Governor	Energy Response Team

12.10 Phase II - Assess and Determine Action - Pipeline Distribution Shortage
Phase II - Assess and Determine Action - In Phase II, having noticed early signs of what might become an energy emergency; responding agencies intensify data and information collection efforts and ensure that the most recent information is available. This information is analyzed to evaluate potential outcomes and assess possible courses of action.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

<ul style="list-style-type: none"> • Appropriate contacts throughout state government should be informed of the results of this assessment. • Appropriate action can then be determined. If no action is required, monitoring and evaluation continue and further updates are made as changes occur. 		
Responders Actions to Be Taken:	Lead Agency	Support Agency
The Energy Response Team monitors fuel supplies. Energy Response Team stores this data in the in the fuel suppliers database.	Energy Response Team	DEMA, PSC
If aviation fuels monitoring activities indicate a possible severe pipeline delivery shortage of petroleum products, notify DEMA and PSC of activity.	Energy Response Team	DEMA, PSC
The Energy Response Team, upon notification by a supplier of a problem, recommends the Governor declare an escalation to Pre-Emergency Phase III. Energy Response Team will notify all other appropriate agencies, associations, and companies that have roles in the SEAP.	Governor	Energy Response Team, DEMA, PSC

12.11 Phase III - Actions and Feedback - Pipeline Distribution Shortage

Phase III - Actions and Feedback - Once a decision has been made that specific state government action is necessary to assure the health, welfare, and safety of citizens, and the continued economic well-being of the State, Phase III activity begins. This includes:

- Implementing programs to maximize available supplies and/or to minimize existing demand levels and monitoring these activities to determine their effectiveness;
- Increasing the level of communication among state agencies and others;
- If the nature of the problem involves multiple states, information sharing among state energy coordinators, using the [EEAC](#) website, should begin; (the password-protected Energy Emergency Assurance Coordinators ([EEAC](#)) website through which authorized state energy emergency coordinators may access valuable energy security information, including daily news summaries, emergency situation reports, lessons learned from other states, links to outage and curtailment information, and the ability to email messages to colleagues in other jurisdictions). [more info](#)
- Convening emergency planning and response organizations to consider actions that might be taken by the various state departments and agencies;
- If implementation of voluntary programs or other emergency deterrent actions fail to mitigate the emergency, begin implementing additional actions;
- If the situation continues to deteriorate, recommending that a "State of Energy Emergency" be declared (usually by the Governor). The Governor may also be called upon to declare a "State of Disaster." State legislation regarding "State of Energy Emergency" and/or "State of Disaster" will dictate further action and assign responsibility among pertinent parties; and
- If it appears that all other options available to the State prove inadequate, the next level of mobilization is to request federal assistance.

Federal assistance would generally be available in the case of a national/international energy emergency; The emergency planning agencies and representatives from other state departments, as appropriate, would be responsible for coordinating and monitoring federal programs; Federal assistance may be requested sooner without a declaration of a national emergency to provide the following;

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

<ul style="list-style-type: none"> • Waiver federal driver hour requirements more info; • Waiver vehicle fuel air quality standards; • Request Coast Guard to intensify ice breaking (if Delaware River is frozen hampering barge movement; and Request Strategic Petroleum Reserve (SPR) or the Northeast Heating Oil Reserves. 		
Responders Actions to Be Taken:	Lead Agency	Support Agency
This phase is activated when aviation fuels stocks and product deliveries become low enough that airports may be forced to close.	Governor DEMA EOC	Energy Response Team Staff
Governor issues Declaration of Emergency.	Governor DEMA EOC	PSC
The Energy Response Team will increase monitoring and analysis of petroleum fuels stocks, product deliveries, consumption patterns, and prices, including maintaining regular contact with suppliers and distributors regarding adequacy of available product.	Energy Response Team	Energy Response Team Staff
The Energy Response Team may prepare necessary mandatory rules and regulations for the governor to cope with the dire shortage of petroleum fuels. Increase the diligence in enforcing compliance with all mandatory aviation fuels conservation measure steps.	Governor	Energy Response Team Staff
The Energy Response Team issues necessary mandatory rules and regulations for the governor to cope with the dire shortage of petroleum fuels. Increase the diligence in enforcing compliance with all mandatory aviation fuels conservation measure steps.	Governor	Energy Response Team Staff

12.12 Phase IV - Review Lessons Learned - Pipeline Distribution Shortage

Phase IV - Review Lessons Learned - In Phase IV, As emergency operations are phased out, responding state agencies should evaluate the emergency preparedness programs and activities that were implemented and report the results to interested parties such as the Governor's Office, cabinet level officers, legislative committees and energy policy councils. Evaluation activities should include:

- Reports describing the nature of the energy emergency and a chronology of the actions taken to respond to it;
- Evaluation of mitigation actions results and of the effectiveness of specific actions taken to respond to the emergency; and
- Critical reviews of the overall performance of the State's energy emergency plans in addressing an emergency.

It should be noted that movement from one phase to another is as much a matter of judgment as it is a matter of objective definition.

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[Transportation-Plan-PowerPoint](#)

[TSA-Comprehensive-Risk-Assessment](#)

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

[TSA-National-Infrastructure-Protection-Plan-Transportation-Sector-Specific-Plan-and-The-TSSP-and-D-Working-Group](#)

[Pipe Line Reference](#)

[SUNOCO Asset Map](#)

[Pipeline Emergency Manual](#)

[National Pipeline System](#)

[West Shore Pipeline](#)

[House Render](#)

[Unloading Fuel at Marcus Hook International Petroleum of Delaware](#)

http://www.tsa.gov/assets/pdf/modal_annex_pipeline.pdf

[Governor lifts travel ban in Kent and Sussex counties](#)

CHAPTER 13 – COMMUNICATION AND PUBLIC INFORMATION

13.0 RESPONSIBILITIES

The responsibilities for addressing energy emergencies in the state of Delaware are delegated to Energy Response Team, Delaware PSC, and the DEMA.

13.1 COMMUNICATION & PUBLIC INFORMATION

The public information system provides guidance and procedures for coordinating emergency public information efforts in support of the state's response during disasters and emergencies. It provides for the effective collection, monitoring, management, and dissemination of accurate, useful, and timely public information to the media and for the public during disasters and emergencies, and Provide long-term public education efforts related to hazard awareness, family protection planning, and emergency self-help One of the most effective crisis management actions the state can take during an energy emergency is to provide a strong, integrated public information program. Timely, accurate information on the energy situation can help prevent confusion and uncertainty, as well as enlist the support and cooperation of the various sectors of the economy. Key participants in the public affairs effort are other state agencies, local governments, the energy supply industry, and private sector entities. Providing these key groups with information about the nature, severity, and possible duration of the energy emergency is essential. It is also vital that the public clearly understands exactly what the energy emergency situation is, and what needs to be done to successfully address the energy shortage crisis. A lack of adequate information on the energy emergency situation and the actions that are being taken to address it can lead to reactions by the public that may worsen the situation.

Providing information to the public is important, but it is equally important for the state to be prepared to gather information and data on the suggestions and recommendations from federal government, citizen groups, and industry groups. Establishing a clearinghouse for this input from both the public and private sectors of state government, public, and industry can aid in this effort.

In the event of an energy shortage, the Energy Response Team staff and the Governor's press secretary serve as the focal point for gathering and distributing information on the energy shortage. In the event of a Governor's declaration of energy emergency, the EOC is activated, which is equipped with conventional telephone and computerized electronic communications systems. In addition, the EOC is linked with the DOE and the energy offices of the other 49 states through the electronic mail system and the Internet. Modifications, adjustments, or the redesign of communications and public information actions may be needed in response to feedback on changing market conditions, unanticipated energy problems confronting public or private sector emergency activities.

13.2 OBJECTIVE AND PURPOSE

The objectives of this program are to provide the citizens of the state with accurate and timely information on the scope, nature, severity, and possible duration of the energy

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

emergency. In order to encourage voluntary compliance with energy emergency response measures, the state must provide an effective visible leadership. This program has many purposes:

- To promote voluntary adoption of each of the measures discussed within this plan.
- To inform citizens about energy conservation actions they can take that would enable them to better cope with and maintain mobility during an energy emergency.
- To stimulate the maximum use of available ride sharing and transit services.
- To promote an energy resource conservation ethic among the citizens of Delaware. This objective will emphasize use of voluntary compliance with the other three measures listed below.
- The Public Information Program can be viewed as a collection of timely low-cost measures, which, if complied with, can collectively produce a significant reduction in fuel demand. The measure consists of a statewide, multimedia publicity and information program to inform the public about methods to conserve fuel. Energy Response Team staff has established ongoing communications with:
 - Other government agencies, institutions, and private sector entities within the state that may have direct or support responsibilities during an energy emergency.
 - Local governments within the state that have the task of implementing programs and providing information at the local level.
 - Federal government agencies, such as the DOE and the Energy Information Agency (EIA) can provide information to assist in evaluating the crisis.

For example, during a refined product supply disruption, promoting fuel conservation techniques to Delaware residents is an effective way to reduce demand. The Governor may request that citizens participate in rideshare programs, use public transit services, observe speed limits, and reduce non-essential travel. The Energy Response Team staff and the Energy Response Team PIO through the state EOC Joint Information Center (JIC) will act as the central clearinghouse for all information regarding results of various voluntary and mandatory programs related to energy demand reduction. This information will be used by the Energy Response Team staff in developing recommendations to the Governor addressing either continuation of current programs or the need for further demand reduction measures.

13.3 INFORMATION GATHERING

The Energy Response Team regularly monitors petroleum activity. This monitoring enables the Energy Response Team to assess the impacts of any potential or existing shortage of petroleum.

13.4 ENERGY INDUSTRY MONITORING

The Energy Response Team staff uses industry monitoring to assess supply and demand in balancing the state's energy industry. The information provides a basic understanding of energy industry activity in the state, both historical background and supply and demand

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

trends. During a potential energy shortage, the Energy Response Team staff will supplement existing data and other available information on petroleum stocks and supplies with up-to-date information provided by established contacts in the petroleum industry. The Energy Response Team staff will develop an initial assessment of the energy supply situation for the Governor.

Energy Response Team staff has the authority to collect wholesale inventory information from fuel suppliers. Such information will remain confidential, but may be necessary to determine response measures.

13.5 MONITORING THE ECONOMIC IMPACTS

The PSC and the Energy Response Team staff will assess the effects of rising prices on various population sectors, particularly on low-income households.

If it is determined that the price increases have a disproportionate impact on low-income households, the Energy Response Team will recommend to the Governor that the state seek additional funding for fuel assistance programs. These programs help low-income households pay energy bills.

13.6 ESTIMATED SAVINGS

The advantage of the Public Information Program is that it can be implemented to reduce energy demand when voluntary conservation is required. By increasing public awareness, demand for the fuel should decline. This would hold true for a more severe energy crisis. However, an accurate measure of how much fuel would be saved is impossible to calculate at present for the following reasons:

- It is difficult to quantify the impact of the media on public compliance with voluntary measures.
- The price increases and supply constraints associated with an energy emergency can by themselves cause individuals already aware of the benefits of the measures to implement them voluntarily without the benefit of public information.

13.7 COMMUNICATION OF VOLUNTARY DEMAND REDUCTION PROGRAMS

The specific voluntary demand reduction programs that will be recommended by the Energy Response Team staff as being most probable for implementation are presented below. Other potential measures may be considered and implemented if they meet the needs. The following guidelines are in-place for this action:

- The public needs timely and accurate energy supply and shortage information for protection of life and property during response to, and recovery from an energy emergency disaster or emergency situation.
- The state may start an emergency public information system to augment or enhance local capabilities or when requested by a local government agency.
- The state may start an emergency public information system to report on the state's disaster response, recovery, and/or mitigation activities.
- Local jurisdictions will provide immediate and vital information to the public regarding energy emergency response and recovery activities.
- At no time will a news release from any state agency conflict with news releases

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

from local government.

- Participating agencies should assign one lead representative to coordinate information from their agency with other team members before it is released to the public.

13.8 COMMUNICATION OF MANDATORY DEMAND AND REDUCTION PROGRAMS

For any mandatory measure imposed by the state, public information will be a vital component. The accuracy and credibility of the information publicly circulated will be of paramount importance for the successful achievement of a more rigorous conservation target utilizing mandatory measures. The Governor's Office has lead responsibility as the official spokesperson for state actions.

13.9 A MEDIA CENTER

The media center consists of spokespersons from the Energy Response Team office, Governor's Office (press secretary) or designated representative, State Coordinating Officer (if energy disaster is declared), DEMA Director, technical experts, and representatives from appropriate state, federal, and local agencies as appropriate; and provides a central location for media briefings, conferences, and information distribution.

To the extent possible, information should be coordinated through the PIO Coordination Team and with appropriate agencies before it is released to the media. Media Center staff should make written records of pertinent information released at briefings and conferences. Staff should remain at the media center, as necessary, while the SEOC is operational. Activation of an inquiry center should take place when initial response from the disaster is concluding and recovery actions are beginning. Appropriate state agencies may be assigned the task of managing the public inquiry centers.

13.10 EMERGENCY ALERT SYSTEM

The Emergency Alert System (EAS) allows local jurisdictions to broadcast an alert only in that specific jurisdiction. For more information regarding EAS see the State of Delaware Emergency Operations Plan.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

13.11 RESOURCES AVAILABLE

State Agency PIO Contact Lists, Media List, Statewide Media List,

ENERGY PUBLIC INFORMATION DUTIES AND RESPONSIBILITIES		
Delaware Governor's Office (GOV)	Lead	Support
Function as Chief of PIO Teams at the SEOC or other operating location	GOV	JIC Staff
Assist and maintain liaison with the media.	GOV	JIC Staff
Maintain liaison with the Governor and his representatives.	GOV	JIC Staff
Establish a briefing and information release schedule.	GOV	JIC Staff
Provide administrative and logistic support.	GOV	JIC Staff
Maintain a record of actions.	GOV	JIC Staff
Delaware Energy Office (Energy Response Team)	Lead	Support
Prepare to activate portions of the Delaware Energy Emergency Response Plan as specific to the energy emergency. Example: Fuel Shortage – Chapter 4.	Energy Response Team	Energy Response Team GOV JIC
Release emergency public information from the SEOC until a JPIC is operational. Coordinate news briefings and conferences in cooperation with the Governor's Office. Provide facilities, equipment, support, and resources at the SEOC. Provide administrative and logistic support. Maintain a record of actions.	Energy Response Team	Energy Response Team GOV JIC
Prepare news releases, fact sheets, background information, and briefing materials for dissemination by the JIC concerning energy actions outlined in this plan...	Energy Response Team	Energy Response Team GOV JIC
Delaware Emergency Management Agency (DEMA)	Lead	Support
Notify PIOs designated to staff the JPIC. Provide personnel as required by the energy disaster emergency.	DEMA JIC	Energy Response Team GOV
Assign one lead representative as a PIO Coordination Team member. Provide personnel as required by the energy emergency. Notify FEMA, U.S. DOE, and other agencies as appropriate. Gather, verify, and coordinate information regarding the disaster situation and activities.	DEMA JIC	Energy Response Team GOV
Release emergency public information from the SEOC until a JPIC is operational. Coordinate news briefings and conferences in cooperation with the Governor's Office. Provide facilities, equipment, support, and resources at the SEOC. Provide administrative and logistic support. Maintain a record of actions. Activate the Emergency Alerting System (EAS) if necessary.	DEMA JIC	Energy Response Team GOV
Provide information and instructions to the public for obtaining energy related disaster relief and assistance. Coordinate information releases through a JIS or JPIC.	DEMA JIC	Energy Response Team GOV
Delaware Public Utility Commission (PSC)	Lead	Support
Prepare to activate portions of the Delaware Energy Emergency Response Plan as specific to the energy emergency that the PSC is responsible for. Such as regulated energy electricity and natural gas. Also, prepare to accept consumer inquiries about increased costs for heating and cooling.	PSC	Energy Response Team GOV

Figure 13.3

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

ENERGY PUBLIC INFORMATION DUTIES AND RESPONSIBILITIES		
State Agencies	Lead	Support
Coordinate information releases through a JIS or JPIC. Ensure that news releases inform public about the problems associated with the energy shortage	State Agencies	Agency Staff
As requested, send representatives to the JPIC who are knowledgeable about energy shortages to your agency.	State Agencies	Agency Staff
Assign one lead representative as a PIO Coordination Team member.	State Agencies	Agency Staff
Gather and verify information from your organization about fuel supplies at motor pool and emergency generators available. Prepare a fuel contingency plan for fuel usage and priorities for travel.	State Agencies	Agency Staff
Prepare news releases, fact sheets, background information, and briefing materials.	State Agencies	Agency Staff
Cooperate with the dissemination of information.	State Agencies	Agency Staff
Provide administrative and logistic support to the Joint Information Center (JIC).	State Agencies	Agency Staff
Maintain a record of actions.	State Agencies	Agency Staff
Local Governments	Lead	Support
Gather and verify information from your organization about fuel supplies at motor pool and emergency generators available. Prepare a fuel contingency plan for fuel usage and priorities for travel.	Local Government	Staff
Gather and verify information from your organization about fuel supplies at motor pool and emergency generators available. Prepare a fuel contingency plan for fuel usage and priorities for travel.	Local Government	Staff
Prepare news releases, fact sheets, background information, and briefing materials for dissemination by the JIC about your community	Local Government	Staff

Figure 13.4

Energy Conservation Public Announcement - Press Release #1

Building Temperature Restrictions Dover— The following contains formatted, suggested public service announcements for use in implementing various conservation mitigation measures in a possible or actual electricity shortage. These announcements are rough draft messages and are designed to be spoken or issued by the State of Delaware Governor's Press Secretary ([some editing may be required for the situation](#)). Additional information may be obtained from the Delaware Energy Office (Energy Response Team) or by phone.

Most natural gas, propane, and wood furnaces rely on electricity to power the various motors and electrical devices. During a severe or prolonged shortage of electricity, it may be necessary to open temporary shelters for individuals or families that have run out of fuel or their furnaces will not function due to a loss of electricity.

The first electricity shortage mitigation measure includes the public information program for the following subjects:

- Building Temperature Restrictions
- Fuel Switching Plan
- Open Temporary Shelters

DEPENDING ON THE SEVERITY OF THE ELECTRICITY SHORTAGE IN THE WINTER, THE GOVERNOR MAY REQUEST VOLUNTARY CONSERVATION IN RESIDENCES BY LOWERING THERMOSTATS OR OTHER CONTROLS TO BETWEEN 60 DEGREES FAHRENHEIT AND 65 DEGREES FAHRENHEIT DURING THE TIME THE SPACE IS OCCUPIED DURING THE DAY AND EVENINGS; BETWEEN 55 DEGREES FAHRENHEIT AND 60 DEGREES FAHRENHEIT AT NIGHT; AND TO 50 DEGREES FAHRENHEIT IN UNOCCUPIED FACILITIES.

DURING THE SUMMER, THE GOVERNOR MAY REQUEST VOLUNTARY CONSERVATION IN RESIDENCES BY RAISING THERMOSTATS OR OTHER CONTROLS OF AIR CONDITIONING TO BETWEEN 75 DEGREES FAHRENHEIT AND 78 DEGREES FAHRENHEIT DURING THE TIME THE SPACE IS OCCUPIED DURING THE DAY AND EVENINGS; BETWEEN 80 DEGREES FAHRENHEIT AND 85 DEGREES FAHRENHEIT AT NIGHT (OR TO DISCONTINUE AIR CONDITIONING AT NIGHT); AND TO DISCONTINUE AIR CONDITIONING IN UNOCCUPIED FACILITIES.

Exemptions: Health care facilities and families with elderly members and children under the age of two.

FUEL SWITCHING PLAN

Switch To Wood Stoves in winter – Many homes in Delaware have the ability to switch to wood heat by acquiring a wood stove. **Moving to Shelters During Winter** - Inform

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

displaced families on the proper procedures to close up residences prior to moving to shelter.

Governor Urges Conservation of Energy in Buildings - Press Release#2

Dover - Today the Delaware Governor announced that the State Energy Coordinator of the Delaware Energy Office (Energy Response Team) stated that electricity supply and distribution problems exist in Delaware. The situation is manageable if all Delaware conserve electricity. Conservation will not only ensure adequate supplies, but will moderate price increases. Voluntary action to use less electricity will prevent the need for mandatory restrictions on electricity consumption. The Delaware Energy Office (Energy Response Team) has more information on reducing home energy use.

Windows let in a lot of cold air. Consumers should use storm windows on the outside and heavy drapes, window quilts, or movable insulation on the inside. If your furnace is old, consult your heating dealer about improving the efficiency of your heating system. If you have not yet insulated the walls and attic of your home, seriously consider making this investment. With rapidly rising fuel costs, the payback period should be shorter.

I urge consumers to use electricity to heat their homes that wood or coal stoves to use the stove as much as possible and minimize the use of electricity. If possible close off the rooms in your house that cannot be heated by wood or coal. I know there are steps each household can take to reduce electricity consumption. In the past, Delaware consumers have responded to periods of tight supply and rising prices by conserving and switching fuels. I am confident that we can again meet the challenge of using electricity more efficiently.

CHAPTER 14 – ENERGY RELATED ECONOMIC ASSISTANCE PROGRAMS

14.1 ECONOMIC ASSISTANCE PROGRAMS

One of the major goals of the plan is to facilitate the distribution of financial assistance designed to help mitigate economic hardships to low-income households in the event of a serious energy supply disruption. Federal and state policies promote the use of market mechanisms to manage supply disruptions, which will result in rising costs of energy to consumers. While the use of market mechanisms is efficient in balancing supply and demand, it results in a disproportionate share of impacts on low-income households.

To compensate for this inequity, the plan includes a provision for economic assistance to help minimize impacts on this segment of the population.

14.2 MULTI-AGENCY TASK FORCE

A Multi-Agency Task Force, representing various agencies involved in the economic assistance programs, convenes in the event of an energy supply disruption. The task force coordinates and oversees the distribution of both state and federal funds during an energy supply disruption. In the event of an emergency, the task force will determine the lead agency and support agency roles, adjusting the details of the operation process to the specific nature of the supply shortage.

14.2.1 ECONOMIC ASSISTANCE COORDINATOR

The governor may designate an Economic Assistance Coordinator to serve on the Multi-Agency Task Force. The Economic Assistance Coordinator must keep abreast of all current state and federal legislation and executive orders that may affect Delaware's Economic Assistance Programs. An Economic Assistance Coordinator will be designated by the governor to serve on the Multi-Agency Task Force as well as serve as liaison between the Delaware Energy Office - Energy Response Team and DEMA. The coordinator must also keep abreast of all current state and federal legislation and executive orders that may affect Delaware's Economic Assistance Programs. Other specific duties of the coordinator may include:

- Upon direction from the Energy Response Team and DEMA, the Coordinator will notify the appropriate members of the task force of the possible need for augmentation of assistance to low-income households.
- The coordinator will work with the task force to develop an interim report outlining the potential extent and duration of economic impacts on low-income households caused by the energy supply disruption.
- The coordinator, with the advice and consent of the chairman, shall notify the governor and the legislature of the need of additional funding for economic assistance programs.
- The coordinator, with the advice and consent of the task force, will offer proposals for increased funding, identifying potential funding sources;
- The coordinator will concurrently contact the U.S. Department of Energy, the U.S. Department of Health and Human Services, etc., requesting additional funding for assistance programs.
- The coordinator is responsible for briefing the task force and the Energy Response Team and DEMA on implementation of the programs and success in securing additional funding.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- The coordinator, in conjunction with the Energy Response Team and DEMA will prepare public announcements of program availability and the application process.
- The coordinator, in conjunction with Energy Response Team and DEMA, will prepare an evaluation of the program results.

14.3 EXISTING ECONOMIC ASSISTANCE PROGRAMS

The primary focus of economic assistance Programs is to use existing mechanisms for redistribution of funds. The plan does not seek to design a new revenue distribution program, which would respond only to an energy supply disruption. Instead, appropriate operational details are added to the process of existing programs, adapting them to a particular energy disruption at the time of the event. This approach minimizes unnecessary advance planning for a specialized program, which can be pre-empted by federal action.

Sufficient funding for economic assistance programs will be determined at the time of implementation. Since it is difficult to identify funding sources prior to implementation, the programs were purposely left flexible with respect to their source of funds. Therefore, the main task of this plan is to identify existing programs which potentially could be augmented to provide maximum relief to low-income households in the most efficient manner, as determined by a Multi-Agency Task Force.

The Division of State Services Centers (DSSC), Office of Community Services manages the [Low Income Home Energy Assistance Program \(LIHEAP\)](#) and the Weatherization Assistance Program in Delaware. Additionally, the Division through its Family Support Unit administers the Delaware Help line, a public/ private partnership with the Department of Administrative Services and [United Way of Delaware's 'First Call for Help'](#); the [Hudson and Milford Family Visitation Centers](#); [Nemours Pharmaceutical Assistance Program](#); Child Restraint Seat Loaner Program; [Low Income Dental and Medical Transportation](#); Emergency Assistance Services; Community Resource and Assistance Program and publishes biannually the Directory of Human Services.

14.3.1 LOW-INCOME ENERGY ASSISTANCE PROGRAM

The federal government established the [Low-Income Heating Assistance Program \(LIHEAP\)](#), which is currently administered in Delaware by the Department of Health and Social Services. The [LIHEAP](#) program has two components:

- Financial assistance to help pay home heating costs.
- A home weatherization program.

14.3.1.1 FINANCIAL ASSISTANCE

The financial assistance part of [LIHEAP](#) is a direct payment program to assist eligible households in offsetting the cost of heating their homes. The amount of financial assistance is based on a payment formula, which calculates low-income population data, utility fuel cost data and income level/household size. General eligibility criteria for [LIHEAP](#) are:

Age: - No limit

Exempt Resources: - Home property, household goods and primary vehicle

Income: - Up to 150% of federal poverty index

Citizenship: - U.S. citizen or alien lawfully admitted for permanent residence

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Residency: - Delaware residency is required, but no duration of residency is stipulated

Vulnerability: - Households must be responsible for paying home heating costs to a utility company, fuel supplier or landlord as part of rent

14.3.1.2 WEATHERIZATION PROGRAM

The [Residential Energy Conservation Assistance Program](#) (RECAP or Weatherization) provides safe, cost-effective energy conservation services (space and domestic water heating) to low-income residents of Delaware. The services provided include: health and safety checks of the heating system, interior air quality, interior moisture levels and structural integrity; heating system efficiency improvements; air leakage reduction; insulation of attics, walls, under floors and crawlspaces; and, client education in energy conservation. The weatherization program has two funding sources: [LIHEAP](#) and the [U.S. Department of Energy Weatherization Assistance Program](#).

14.3.1.3 LOW INCOME HOME ENERGY ASSISTANCE PROGRAM ([LIHEAP](#))

The [Delaware Energy Assistance Program \(DEAP\)](#) is a federally funded program for low-income families that need help in meeting their costs of home energy. The [Division of State Service Centers \(DSSC\)](#) administers this program on a contractual basis with Catholic Charities, Inc. Funds are provided by the U.S. Department of Health & Human Services (HHS), under the [Low-Income Home Energy Assistance Program \(LIHEAP\)](#). [DEAP](#) services provide assistance to income eligible families to help them meet their home energy needs. Income eligibility is defined as 200% of the federal poverty level. (As a reference, please see the Division of Social Services' [Income Eligibility tables](#)). [DEAP](#) has several components which include:

- **Fuel Assistance:** Help with home energy bills from the period of October 1 - March 31. This includes grants to income eligible households to help pay for home heating, which includes electricity, natural gas, kerosene, propane, coal, or wood. Grants are made to both homeowners and renters.
- **Crisis Assistance:** This component helps households in crisis during the winter months and may be in the form of a supplemental grant to their fuel assistance benefit. In addition to being income eligible, households must show they are experiencing a crisis (i.e., shut-off notice, out of fuel, no money to pay for fuel).
- [Summer Cooling Assistance Program \(SCAP\)](#): This program operates during the months of June-August and helps pay for electricity to cool homes with air conditioning during the hot, humid summer months. In addition to receiving a grant to offset the high costs of electricity to air condition a home, some populations may be eligible to receive a room sized air conditioning unit.

It is important to call [Catholic Charities](#) to find out where and how to apply for assistance. To contact Catholic Charities call:

- Kent County: (302) 674-1782
- New Castle County: (302) 654-9295
- Sussex County: (302) 856-6310

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

For additional information about LIHEAP, the following link is available:

www.neada.org

For further information, [contact the Delaware Division of State Service Centers](#).

WHAT ARE THE INCOME LIMITS FOR APPLYING FOR DSS PROGRAMS?

Financial eligibility criteria vary from program to program. However, the two most common benchmarks by which DMMA sets income criteria are the:

- Federal Poverty Level (FPL) Tables

- [100% FPL](#)
- [120% FPL](#)
- [130% FPL](#)
- [133% FPL](#)
- [135% FPL](#)
- [165% FPL](#)
- [200% FPL](#)
- [300% FPL](#)
- [650% FPL](#)

- Supplemental Security Income (SSI)

Please check the information for the specific program or service for the exact criteria. However, the following tables may help you determine where your family is, in relation to these benchmarks.

If you want to find out more about how much your family would pay for the Delaware Healthy Children Program (DHCP), see the [Table of DHCP Monthly Premiums](#) below.

2008 Countable Income Limits 100% FPL		
Family Size	Gross Annual Income	Gross Monthly Income
1	10400	867
2	14000	1167
3	17600	1467
4	21200	1767
5	24800	2067
6	28400	2367
7	32000	2667
8	35600	2967
9	39200	3267
10	42800	3567

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

2008 Countable Income Limits 120% FPL	
Family Size	Gross Monthly Income
1	1,040
2	1,400
2008 Countable Income Limits 130% FPL	
Family Size	Gross Monthly Income
1	1,127
2	1,517
3	1,907
4	2,297
5	2,687
6	3,077
7	3,467
8	3,857
Each additional	+390
2008 Countable Income Limits 133% FPL	
Family Size	Gross Monthly Income
1	1,153
2	1,552
3	1,951
4	2,350
5	2,749
6	3,148
7	3,547
8	3,946
9	4,345
10	4,744
2008 Countable Income Limits	

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

135% FPL		
Family Size		Gross Monthly Income
1		1,170
2		1,575
2008 Countable Income Limits 165% FPL		
Family Size		Gross Monthly Income
1		1,431
2		1,926
3		2,421
4		2,916
5		3,411
6		3,906
7		4,401
8		4,896
9		5,391
10		5,886
2008 Countable Income Limits 200% FPL		
Family Size	Gross Annual Income*	Gross Monthly Income*
1	20,800	1,734
2	28,000	2,334
3	35,200	2,934
4	42,400	3,534
5	49,600	4,134
6	56,800	4,734
7	64,000	5,334
8	71,200	5,934
9	78,400	6,534
10	85,600	7,134

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

* For the Delaware Prescription Assistance Program, an individual must have countable income at or below 200% FPL.

2008 Countable Income Limits 300% FPL	
Family Size	Gross Monthly Income
1	2,601
2	3,501
3	4,401
4	5,301
5	6,201
6	7,101
7	8,001
8	8,901
9	9,801
10	10,701

2008 Countable Income Limits 650% FPL			
Family Size	Gross Annual Income	Gross Monthly Income	Gross Weekly Income
1	67,600	5,633	1,310
2	91,000	7,583	1,764
3	114,400	9,533	2,217
4	137,800	11,483	2,671
5	161,200	13,433	3,124
6	184,600	15,383	3,578
7	208,000	17,333	4,031
8	231,400	19,283	4,484
For each additional person, add	23,400	1,950	453

Delaware Healthy Children Program Monthly Premium Based on Countable Family Income % of FPL
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STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Family Size	Monthly Income > 100% and < 133% Premium \$10	Monthly Income > 133% and < 166% Premium \$15	Monthly Income > 166% and < 200% Premium \$25
1	867 - 1,153	1,154 - 1,439	1,440 - 1,734
2	1,167 - 1,552	1,553 - 1,937	1,938 - 2,334
3	1,467 - 1,951	1,952 - 2,435	2,436 - 2,934
4	1,767 - 2,350	2,351 - 2,933	2,934 - 3,534
5	2,067 - 2,749	2,750 - 3,431	3,432 - 4,134
6	2,367 - 3,148	3,149 - 3,929	3,930 - 4,734
7	2,667 - 3,547	3,548 - 4,427	4,428 - 5,334
8	2,967 - 3,946	3,947 - 4,925	4,926 - 5,934
9	3,267 - 4,345	4,346 - 5,423	5,424 - 6,534
10	3,567 - 4,744	4,745 - 5,921	5,922 - 7,134

CHAPTER 15 – ENERGY SHORTAGE EMERGENCY MITIGATION MEASURES & PROJECTS



Project 1 Resolved!

Background: - The Delaware City Refinery was closed in 2009. It is located on 5,000 acres just south of Wilmington Delaware. John Paul Getty built the Delaware City Refinery in the early 1950's because he had found a source of crude in the Neutral Zone that was too high in sulfur for any US Refinery to refine. The Delaware City Refinery was built to handle crude that contained sulfur as high as 3 %. This refinery has changed hands many times over the past 50 years and once was: Texaco, Star, Motive, Shell, and now Valero. The refinery is located on 5,000 acres of ground in Del. City, Delaware. It is rated at 210,000 barrels per day and could produce near 3 million gallons of gasoline per day. Its production included conventional and reformulated gasoline, low-sulfur diesel, and home-heating oil. Delaware City produced and sold: gasoline, diesel fuel, heating oil, propane, and ultra-low-sulfur diesel; and many specialty chemicals like benzene, toluene, oxygen, nitrogen, and sulfuric acid. The site includes a large (166' wide x 123' deep) propane cavern know as "frozen earth" that stores upwards of 20 million gallons of propane. This cavern is filled during the summer months when demand for propane is low and sold off during the winter as demand increases. Due to the size of this cavern the supply of propane was never a problem for local vendors in the area.

Contributing to the plant's efficiency was a 1,800-tons-per-day petroleum-coke gasification unit. The refinery's petroleum coke production is sold to third parties or is gasified to fuel. The 180-megawatt co-generation power plant was designed to supply electricity and steam to the refinery. The delivery of crude to the refinery was directly at the Valero piers or by barge. The products were shipped out by pipeline, barge or through the truck loading rack.

The closest refinery to the Delmarva Peninsula is Sunoco Marcus Hook Refinery, PA approximately 57.5 miles away and 1.5 hours of driving time to Dover, DE. The Marcus Hook Refinery (opened in 1902) is located on the Delaware River and is the second largest refinery in the northeast. The Marcus Hook Refinery is capable of processing 190,000 barrels a day.

Great NEWS! - Apr 08, 2010 - PBF Energy Partners, LP ("PBF") has entered into an agreement to acquire the 190,000 barrel per day Delaware City refinery, terminal and pipeline assets plus the 218 MW Power Plant Complex from Valero Energy Corporation. The purchase price consists of \$170 million for the idled refinery and related assets and

an additional \$50 million for the Power Plant Complex. PBF intends to perform major maintenance work at the refinery over the next nine months and plans to restart the refinery in the spring of 2011.

Projects

During December 15-17, 2009, Robert Kistner and Pierre LeBlanc, Energy Planning Consultants, Inc. (EPC) and Charlie Smisson, Delaware Energy Office, met with the Delaware Emergency Management Agency (DEMA) management and others at the State of Delaware Emergency Operations Center (EOC) in Smyrna, Delaware. The purpose of the meeting was to discuss the Delaware Energy Office's Energy Assurance Planning (EAP) project with DEMA officials. EPC explained our role in updating the EAP and participation in the two-exercises proposed for the future. EPC is well underway with the EAP and it is posted for viewing at the www.de-eap-portal.org web-site. During the meeting, DEMA Director James Turner III, and others explained the state's plan for evacuation and sheltering during natural and man-made disasters.

EPC displayed our [emergency fueling hose assembly](#) and our methods of identification of emergency fueling stations located at existing motor fueling station (gas station/convenience stores). DEMA encouraged EPC to search out several options for emergency generator-powering fueling tanks at various locations and several city/county fueling locations. This proposal is as a result of this conversation.

February 11, 2010 - Second winter storm in state of Delaware, emergency declared .

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On February 11, 2010, the Delaware state of Emergency remained in full effect following the announcement of Delaware Governor Jack Markell after the winter storm continued pouring snow. State of Delaware is bearing second major winter storm of the year. On March 3, 2010 - the [DEMA Disaster Preparedness Coalition](#) (Governor Markell attended) conducted a meeting in Georgetown, DE with the goal of educating all Delawareans on how to prepare for a disaster. This multi-faceted approach will increase the number of Delaware citizens who are prepared for disasters, whether natural or technological. The recent heavy snow fall illustrated how many can lose power and sometimes be confined to their homes and shelters for several days during a State of Emergency and while roads are cleared. Manmade disasters, such as a hazardous chemical spill or even a terrorist event, could disrupt travel or cause evacuation ([see Delaware evacuation routes](#)). Suitable refueling stations will be located along evacuation routes and may include commercial [gasoline stations](#). During the above mentioned severe weather, Delaware experienced heavy snow and ice and many shelters were opened. As a follow-up to this declared disaster,

Project 1 - Part 1

Part-1 - EPC proposes to survey the critical facilities which were utilized during the above incident and others to determine if any of these "shelters" could not be opened due to a loss of electricity. If they were not opened due to this reason. These relief shelters (better known as American Red Cross approved shelters) will be surveyed to examine if emergency generators are present and operating. If we find a shelter without a generator, we will size a generator for the facility and provide cost estimates for a possible future project and installation. EPC's Bob Kistner and Pierre LeBlanc are American Red Cross (ARC) volunteers and former staff members of the ARC Denver Mile High Chapter and

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

experienced in ARC shelter operations. Specific locations and proposals (for possible funding) will be routed through the Delaware Energy Office - Energy Response Team on behalf of the applicants. This survey of facilities will also include critical facilities owned by the State of Delaware.

Project 1 - Part 2

Part 2 – EPC will examine the evacuation routes in Delaware as determined by DEMA and DELDOT. EPC will then determine which gasoline stations/convenience stores are best candidates to serve as “refueling sites” (we will choose two as candidates). EPC will obtain routes for refueling the sites and then determine the correct size of generator, fuel type etc. EPC will provide this information to the Delaware Energy Office - Energy Response Team for project activation. Part 3 – EPC will include a monthly report of the project activities in the monthly report of activities to the Delaware Energy Office Energy Response Team. A final report of the project will be displayed in the www.de-eap-portal.org and in “hard copy” to the Delaware Energy Office - Energy Response Team.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

APPENDIX A – CONTACTS

<http://www.delaware.gov/> for Delaware State Contacts

Delaware State of Department of Agriculture weights and measure

2320 S Dupont Hwy, Camden, DE 19934, (302) 698-4500, The Weights and Measures Section has an impact on virtually every aspect of our lives. The meter that delivers your heating fuel and the pump that fills the gas tank of your car is checked by our inspectors.

Electricity:

Southern Delmarva Office -- [Directions](#)

Serving Kent and Sussex counties, DE - Caroline, Dorchester, Queen Anne's, and Talbot Counties, MD
523 North Market St. Ext.

Ross Business Park

Seaford, DE 19973 Phone: (800) 777-6620 Fax: (302) 262-0333

Upper Shore Training Center, MD Office -- [Directions](#)

Serving Cecil and Kent Counties, MD

207 Blue Ball Ave.

Elkton, MD 21921, (Phone: (410) 398-2470 Phone, Fax: (410) 398-5396 Fax
Toll Free: (24 hr answering service) (800) 777-6620

INDIAN RIVER GENERATING STATION, MILLSBORO, DELAWARE, 740 NET MW

For more information, contact:

DREW MURPHY, President, Northeast Region

609.524.5115 - drew.murphy@nrgenergy.com

NRG Energy, Inc., 211 Carnegie Center, Princeton, NJ 08540 - 609.524.4500 www.nrgenergy.com

[Indian River Fact Sheet](#)

CONECTIV ENERGY EDGE MOOR POWER PLANT CONTACTS

Corporate Offices

P.O. Box 6066

Newark, DE 19714-6066

302-451-5500

MEDIA CONTACT INFORMATION

Vicki Luttrell, Communications Manager 302-451-5500, EnergyCommunications@conectiv.com

MQ Riding - Director, Communications & Public Affairs, EnergyCommunications@conectiv.com

POWER AND GAS ORIGINATION CONTACT INFORMATION

Champe Fisher, Director, Power Origination, PowerOrigination@conectiv.com

Al Gallo, Director, Natural Gas Supply and Trading, PowerOrigination@conectiv.com

Eric Stallings, Director, Northeast Power Origination, PowerOrigination@conectiv.com

Martin Cattoni, Gas Originator, PowerOrigination@conectiv.com

Gary Ferenz, Renewable Power, PowerOrigination@conectiv.com

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Sherrie Ford, Power Origination Analyst, PowerOrigination@conectiv.com

John Foreman, Power Originator, PowerOrigination@conectiv.com

Kelley Gabbard, Power Originator, PowerOrigination@conectiv.com

PHI Links

[Pepco Holdings, Inc.](#)

[Atlantic City Electric](#)

[Delmarva Power](#)

[Pepco](#)

[Pepco Energy Services](#)

Petroleum

Mid-Atlantic Petroleum Distributors Association

Contact: Peter Horrigan

1517 Ritchie Highway, Suite 206, Arnold, MD 21012

Phone: 410-349-0808 Fax: 410-349-8510 E-mail: petegwyn@aol.com

The American Red Cross of the Delmarva Peninsula, covering 9 counties and serving over 1 million people, has three offices to serve you.

Northern Delmarva Office -- [Directions](#)

Serving New Castle County, Delaware

100 West 10th Street, Suite 501

Wilmington, DE 19801-1678, Phone: (302) 656-6620, Fax: (302) 656-8797

Toll Free: (800) 777-6620

AAA

1000 AAA Drive

Heathrow, FL 32746

(407) 444-7000/Fax: (407) 444-7614

American Gas Association

400 North Capital St., NW

Washington, D.C. 20001

(202) 824-7000/Fax: (202) 824-7115

www.aga.org

Association of Oil Pipe Lines

1101 Vermont Avenue, N.W., Ste. 604

Washington, D.C. 20005

(202) 408-7970/Fax: (202) 408-7983

Independent Liquid Terminals Association

1133 15th St. N.W., Ste. 650

Washington, D.C. 20009

(202) 857-4722/Fax: (202) 446-4166

www.ilta.org

National Petroleum Council

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

1625 K Street, NW Ste 600
Washington, D.C. 20006
(202) 393-6100/Fax: (202) 331-8539
www.npc.org

National Petroleum & Refiners Association

1899 L Street, NW Ste 1000
Washington, D.C. 20036
(202) 457-0480/Fax: (202) 457-0486
www.npradc.org

Petroleum Marketers Association of America (PMAA)

1901 N Fort Myer Drive, Suite 1200
Arlington, VA 22209-1604
Office: (703) 351-8000
FAX: (703) 351-9160
dgilligan@pmaa.org

Petroleum Transportation & Storage Association (PTSA)

4200 Wisconsin Ave NW, Suite 106
Washington, DC 20016
Office: (202) 364-6767
FAX: (202) 966-4560
ptsa@erols.com

Williams Gas Pipeline

Williams Gas Pipeline
3800 Frederica Street
Owensboro, Kentucky 42301
(270) 926-8686

24-hour Gas Control

(800) 626-1948

Department of Agriculture

Measurement Standards Section

To find out if you or someone you know is eligible for no-cost weatherization services, call toll-free **1-888-HEATLINE (1-888-432-8546)**. Your local service agency can answer questions about the program and assist with the application process.

NATIONAL ASSOCIATION OF STATE ENERGY OFFICIALS

1414 Prince St., Suite 200, Alexandria, Va. 22314
Phone: (703) 299-8800 Fax: (703) 299-6208
www.naseo.org

NATIONAL ASSOCIATION OF REGULATORY UTILITY COMMISSIONERS

1101 Vermont, N.W., Suite 200
Washington, DC 20005, USA
Phone: (202) 898-2200

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Fax: (202) 898-2213

admin@naruc.org

FEDERAL

Office of Electricity Delivery and Energy Reliability
Infrastructure Security and Energy Restoration (ISER) Division
U. S. Department of Energy
100 Independence Avenue, S.W.
Washington, D.C. 20585
Website www.oe.netl.doe.gov

Energy Emergency Contact:

Alice Lippert

Office: 202-586-9600

Personal Cell: 240-997-6348

Email: Alice.Lippert@hq.doe.gov

DOE Emergency Operations Center: 202-586-8100

Department of Homeland Security Contact Information

National Infrastructure Coordinating Center (NICC)

As a key component of the Infrastructure Coordination Division (ICD), the National Infrastructure Coordinating Center (NICC), serving as an extension of the Homeland Security Operations Center, provides the mission and capabilities to assess the operational status of the nation's Critical Infrastructures and Key Resources, supports information sharing with the Information Sharing and Analysis Centers (ISACs) and the owners and operators of critical infrastructure facilities, and facilitates information sharing across and between the individual sectors. Please email or call the NICC at the new contact information provided below for information, and to report issues of a physical nature that may affect or have an impact on our Nation's Critical Infrastructures and Key Resources.

E-mail: nicc@dhs.gov

Phone: 202-282-9201, 9202, and 9203

Fax: 703-607-4998

US-CERT

As part of the National Cyber Security Division, the United States Computer Emergency Readiness Team (US-CERT), a partnership between the DHS National Cyber Security Division (NCSD) and the private sector, has been established to protect our Nation's Internet infrastructure.

Please visit www.us-cert.gov for information, and to report issues that may affect or have an impact on our Nation's Internet infrastructure.

The DHS looks forward to serving you, our customers, with our continued mission of protecting the Nation from terrorism. Please visit our Web site at www.dhs.gov for more information.

GLOSSARY OF TERMS

Active solar: As an energy source, energy from the sun collected and stored using mechanical pumps or fans to circulate heat-laden fluids or air between solar collectors and a building.

Actual peak reduction: The actual reduction in annual peak load (measured in kilowatts) achieved by customers that participate in a utility demand-side management (DSM) program. It reflects the changes in the demand for electricity resulting from a utility DSM program that is in effect at the same time the utility experiences its annual peak load, as opposed to the installed peak load reduction capability (i.e., potential peak reduction). It should account for the regular cycling of energy efficient units during the period of annual peak load.

Adjustable speed drives: Drives that save energy by ensuring the motor's speed is properly matched to the load placed on the motor. Terms used to describe this category include polyphase motors, motor oversizing, and motor rewinding.

Adjusted electricity: A measurement of electricity that includes the approximate amount of energy used to generate electricity. To approximate the adjusted amount of electricity, the site-value of the electricity is multiplied by a factor of 3. This conversion factor of 3 is a rough approximation of the Btu value of raw fuels used to generate electricity in a steam-generation power plant.

Air conditioning: Cooling and dehumidifying the air in an enclosed space by use of a refrigeration unit powered by electricity or natural gas. *Note:* Fans, blowers, and evaporative cooling systems ("swamp coolers") that are not connected to a refrigeration unit are excluded.

Air conditioning intensity: The ratio of air-conditioning consumption or expenditures to square footage of cooled floor space and cooling degree-days (base 65 degrees F). This intensity provides a way of comparing different types of housing units and households by controlling for differences in housing unit size and weather conditions. The square footage of cooled floor space is equal to the product of the total square footage times the ratio of the number of rooms that could be cooled to the total number of rooms. If the entire housing unit is cooled, the cooled floorspace is the same as the total floorspace. The ratio is calculated on a weighted, aggregate basis according to this formula:

Air-Conditioning Intensity = Btu for Air Conditioning / (Cooled Square Feet * Cooling Degree-Days)

Air pollution abatement equipment: Equipment used to reduce or eliminate airborne pollutants, including particulate matter (dust, smoke, fly, ash, dirt, etc.), sulfur oxides, nitrogen oxides (NO_x), carbon monoxide, hydrocarbons, odors, and other pollutants. Examples of air pollution abatement structures and equipment include flue-gas particulate collectors, flue-gas desulfurization units and nitrogen oxide control devices.

Alternative fuel: Alternative fuels, for transportation applications, include the following:

- methanol
- denatured ethanol, and other alcohols
- fuel mixtures containing 85 percent or more by volume of methanol, denatured ethanol, and other alcohols with gasoline or other fuels -- natural gas
- liquefied petroleum gas (propane)
- hydrogen
- coal-derived liquid fuels
- fuels (other than alcohol) derived from biological materials (biofuels such as soy diesel fuel)
- electricity (including electricity from solar energy.)

"... any other fuel the Secretary determines, by rule, is substantially not petroleum and would yield substantial energy security benefits and substantial environmental benefits." The term "alternative fuel" does not include alcohol or other blended portions of primarily petroleum-based fuels used as oxygenates or extenders, i.e. MTBE, ETBE, other ethers, and the 10-percent ethanol portion of gasohol.

Alternative-fuel vehicle (AFV): A vehicle designed to operate on an alternative fuel (e.g., compressed natural gas, methane blend, electricity). The vehicle could be either a dedicated vehicle designed to operate exclusively on alternative fuel or a nondedicated vehicle designed to operate on alternative fuel and/or a traditional fuel.

Alternative fuel vehicle converter: An organization (including companies, government agencies and utilities), or individual that performs conversions involving alternative alternative fuel vehicles. An AFV converter can convert (1) conventionally fueled vehicles to AFVs, (2) AFVs to conventionally fueled vehicles, or (3) AFVs to use another alternative fuel.

Anthracite: The highest rank of coal; used primarily for residential and commercial space heating. It is a hard, brittle, and black lustrous coal, often referred to as hard coal, containing a high percentage of fixed carbon and a low percentage of volatile matter. The moisture content of fresh-mined anthracite generally is less than 15 percent. The heat content of

anthracite ranges from 22 to 28 million Btu per ton on a moist, mineral-matter-free basis. The heat content of anthracite coal consumed in the United States averages 25 million Btu per ton, on the as-received basis (i.e., containing both inherent moisture and mineral matter). *Note:* Since the 1980's, anthracite refuse or mine waste has been used for steam electric power generation. This fuel typically has a heat content of 15 million Btu per ton or less.

Aviation gasoline (finished): A complex mixture of relatively volatile hydrocarbons with or without small quantities of additives, blended to form a fuel suitable for use in aviation reciprocating engines. Fuel specifications are provided in ASTM Specification D 910 and Military Specification MIL-G-5572. *Note:* Data on blending components are not counted in data on finished aviation gasoline.

Aviation gasoline blending components: Naphthas that will be used for blending or compounding into finished aviation gasoline (e.g., straight run gasoline, alkylate, reformat, benzene, toluene, and xylene). Excludes oxygenates (alcohols, ethers), butane, and pentanes plus. Oxygenates are reported as other hydrocarbons, hydrogen, and oxygenates.

Backup fuel: In a central heat pump system, the fuel used in the furnace that takes over the space heating when the outdoor temperature drops below that which is feasible to operate a heat pump.

Backup Generator: A generator that is used only for test purposes, or in the event of an emergency, such as a shortage of power needed to meet customer load requirements.

Backup power: Electric energy supplied by a utility to replace power and energy lost during an unscheduled equipment outage.

Barrel: A unit of volume equal to 42 U.S. gallons.

Barrels per Calendar day: The amount of input that a distillation facility can process under usual operating conditions. The amount is expressed in terms of capacity during a 24-hour period and reduces the maximum processing capability of all units at the facility under continuous operation (see **Barrels per Stream Day** below) to account for the following limitations that may delay, interrupt, or slow down production.

1. the capability of downstream processing units to absorb the output of crude oil processing facilities of a given refinery. No reduction is necessary for intermediate streams that are distributed to other than downstream facilities as part of a refinery's normal operation;
2. the types and grades of inputs to be processed;
3. the types and grades of products expected to be manufactured;
4. the environmental constraints associated with refinery operations;
5. the reduction of capacity for scheduled downtime due to such conditions as routine inspection, maintenance, repairs, and turnaround; and
6. the reduction of capacity for unscheduled downtime due to such conditions as mechanical problems, repairs, and slowdowns.

Barrels per Stream day: The maximum number of barrels of input that a distillation facility can process within a 24-hour period when running at full capacity under optimal crude and product slate conditions with no allowance for downtime.

Base load: The minimum amount of electric power delivered or required over a given period of time at a steady rate.

Base load capacity: The generating equipment normally operated to serve loads on an around-the-clock basis.

Base load plant: A plant, usually housing high-efficiency steam-electric units, which is normally operated to take all or part of the minimum load of a system, and which consequently produces electricity at an essentially constant rate and runs continuously. These units are operated to maximize system mechanical and thermal efficiency and minimize system operating costs.

Base period: The period of time for which data used as the base of an index number, or other ratio, have been collected. This period is frequently one of a year but it may be as short as one day or as long as the average of a group of years. The length of the base period is governed by the nature of the material under review, the purpose for which the index number (or ratio) is being compiled, and the desire to use a period as free as possible from abnormal influences in order to avoid bias.

Base rate: A fixed kilowatthour charge for electricity consumed that is independent of other charges and/or adjustments.

Baseboard heater: As a type of heating equipment, a system in which either electric resistance coils or finned tubes carrying steam or hot water are mounted behind shallow panels along baseboards. Baseboards rely on passive convection to distribute heated air in the space. Electric baseboards are an example of an "Individual Space Heater." (Also see **Individual Space Heater**.)

bbl: The abbreviation for barrel(s).

bbl/d: The abbreviation for barrel(s) per day.

bbl/sd: The abbreviation for barrel(s) per stream day

bcf: The abbreviation for billion cubic feet.

Benzene (C₆H₆): An aromatic hydrocarbon present in small proportion in some crude oils and made commercially from petroleum by the catalytic reforming of naphthenes in petroleum naphtha. Also made from coal in the manufacture of

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

coke. Used as a solvent in the manufacture of detergents, synthetic fibers, petrochemicals, and as a component of high-octane gasoline.

Bi-fuel vehicle: A motor vehicle that operates on two different fuels, but not on a mixture of the fuels. Each fuel is stored in a separate tank.

Biodiesel: Any liquid biofuel suitable as a diesel fuel substitute or diesel fuel additive or extender. Biodiesel fuels are typically made from oils such as soybeans, rapeseed, or sunflowers, or from animal tallow. Biodiesel can also be made from hydrocarbons derived from agricultural products such as rice hulls.

Biofuels: Liquid fuels and blending components produced from biomass (plant) feedstocks, used primarily for transportation.

Biomass: Organic nonfossil material of biological origin constituting a renewable energy source.

Biomass gas: A medium Btu gas containing methane and carbon dioxide, resulting from the action of microorganisms on organic materials such as a landfill.

Bitumen: A naturally occurring viscous mixture, mainly of hydrocarbons heavier than pentane, that may contain sulphur compounds and that, in its natural occurring viscous state, is not recoverable at a commercial rate through a well.

Bituminous coal: A dense coal, usually black, sometimes dark brown, often with well-defined bands of bright and dull material, used primarily as fuel in steam-electric power generation, with substantial quantities also used for heat and power applications in manufacturing and to make coke. Bituminous coal is the most abundant coal in active U.S. mining regions. Its moisture content usually is less than 20 percent. The heat content of bituminous coal ranges from 21 to 30 million Btu per ton on a moist, mineral-matter-free basis. The heat content of bituminous coal consumed in the United States averages 24 million Btu per ton, on the as-received basis (i.e., containing both inherent moisture and mineral matter).

Blending components: See [Motor gasoline blending components](#).

Blending plant: A facility that has no refining capability but is either capable of producing finished motor gasoline through mechanical blending or blends oxygenates with motor gasoline.

Bonded petroleum imports: Petroleum imported and entered into Customs bonded storage. These imports are not included in the import statistics until they are: (1) withdrawn from storage free of duty for use as fuel for vessels and aircraft engaged in international trade; or (2) withdrawn from storage with duty paid for domestic use.

Borderline customer: A customer located in the service area of one utility, but supplied by a neighboring utility through an arrangement between the utilities.

Bottled gas: See [Liquefied petroleum gases](#).

Bottled gas, LPG, or propane: Any fuel gas supplied to a building in liquid form, such as liquefied petroleum gas, propane, or butane. It is usually delivered by tank truck and stored near the building in a tank or cylinder until used.

Branded product: A refined petroleum product sold by a refiner with the understanding that the purchaser has the right to resell the product under a trade name, service mark, or other identifying symbol or names owned by such refiner.

British thermal unit: The quantity of heat required to raise the temperature of 1 pound of liquid water by 1 degree Fahrenheit at the temperature at which water has its greatest density (approximately 39 degrees Fahrenheit).

Btu: The abbreviation for British thermal unit(s).

Btu conversion factors: Btu conversion factors for site energy are as follows:

Electricity 3,412 Btu/kilowatthour
Natural Gas 1,031 Btu/cubic foot
Fuel Oil No.1 135,000 Btu/gallon
Kerosene 135,000 Btu/gallon
Fuel Oil No.2 138,690 Btu/gallon
LPG (Propane) 91,330 Btu/gallon
Wood 20 million Btu/cord

Btu per cubic foot: The total heating value, expressed in Btu, produced by the combustion, at constant pressure, of the amount of the gas that would occupy a volume of 1 cubic foot at a temperature of 60 degrees F if saturated with water vapor and under a pressure equivalent to that of 30 inches of mercury at 32 degrees F and under standard gravitational force (980.665 cm. per sec. squared) with air of the same temperature and pressure as the gas, when the products of combustion are cooled to the initial temperature of gas and air when the water formed by combustion is condensed to the liquid state. (Sometimes called gross heating value or total heating value.)

BTX: The acronym for the commercial petroleum aromatics--benzene, toluene, and xylene. See individual categories for definitions

Bunker fuels: Fuel supplied to ships and aircraft, both domestic and foreign, consisting primarily of residual and distillate fuel oil for ships and kerosene-based jet fuel for aircraft. The term "international bunker fuels" is used to denote the consumption of fuel for international transport activities. Note: For the purposes of greenhouse gas emissions inventories,

data on emissions from combustion of international bunker fuels are subtracted from national emissions totals. Historically, bunker fuels have meant only ship fuel.

Captive refinery MTBE plants: MTBE (methyl tertiary butyl ether) production facilities primarily located within refineries. These integrated refinery units produce MTBE from Fluid Cat Cracker isobutylene with production dedicated to internal gasoline blending requirements.

Captive refinery oxygenate plants: Oxygenate production facilities located within or adjacent to a refinery complex. **CO control period ("seasons"):** The portion of the year in which a CO nonattainment area is prone to high ambient levels of carbon monoxide. This portion of the year is to be specified by the Environmental Protection Agency but is to be not less than 4 months in length.

Coal: A readily combustible black or brownish-black rock whose composition, including inherent moisture, consists of more than 50 percent by weight and more than 70 percent by volume of carbonaceous material. It is formed from plant remains that have been compacted, hardened, chemically altered, and metamorphosed by heat and pressure over geologic time.

Coal analysis: Determines the composition and properties of coal so it can be ranked and used most effectively.

- **Proximate analysis** determines, on an as-received basis, the moisture content, volatile matter (gases released when coal is heated), fixed carbon (solid fuel left after the volatile matter is driven off), and ash (impurities consisting of silica, iron, alumina, and other incombustible matter). The moisture content affects the ease with which coal can be handled and burned. The amount of volatile matter and fixed carbon provides guidelines for determining the intensity of the heat produced. Ash increases the weight of coal, adds to the cost of handling, and can cause problems such as clinking and slagging in boilers and furnaces.
- **Ultimate analysis** determines the amount of carbon, hydrogen, oxygen, nitrogen, and sulfur. Heating value is determined in terms of Btu, both on an as received basis (including moisture) and on a dry basis.
- **Agglomerating** refers to coal that softens when heated and forms a hard gray coke; this coal is called caking coal. Not all caking coals are coking coals. The agglomerating value is used to differentiate between coal ranks and also is a guide to determine how a particular coal reacts in a furnace.
- **Agglutinating** refers to the binding qualities of a coal. The agglutinating value is an indication of how well a coke made from a particular coal will perform in a blast furnace. It is also called a caking index.
- **Other tests** include the determination of the ash softening temperature, the ash fusion temperature (the temperature at which the ash forms clinkers or slag), the free swelling index (a guide to a coal's coking characteristics), the Gray King test (which determines the suitability of coal for making coke), and the Hardgrove grindability index (a measure of the ease with which coal can be pulverized). In a petrographic analysis, thin sections of coal or highly polished blocks of coal are studied with a microscope to determine the physical composition, both for scientific purposes and for estimating the rank and coking potential.

Coal bed: A bed or stratum of coal. Also called a coal seam.

Coal bed degasification: This refers to the removal of methane or coal bed gas from a coal mine before or during mining.

Coal bed methane: Methane is generated during coal formation and is contained in the coal microstructure. Typical recovery entails pumping water out of the coal to allow the gas to escape. Methane is the principal component of natural gas. Coal bed methane can be added to natural gas pipelines without any special treatment.

Coal briquets: Anthracite, bituminous, and lignite briquets comprise the secondary solid fuels manufactured from coal by a process in which the coal is partly dried, warmed to expel excess moisture, and then compressed into briquets, usually without the use of a binding substance. In the reduction of briquets to coal equivalent, different conversion factors are applied according to their origin from hard coal, peat, brown coal, or lignite.

Coal carbonized: The amount of coal decomposed into solid coke and gaseous products by heating in a coke oven in a limited air supply or in the absence of air.

Coal chemicals: Coal chemicals are obtained from the gases and vapor recovered from the manufacturing of coke. Generally, crude tar, ammonia, crude light oil, and gas are the basic products recovered. They are refined or processed to yield a variety of chemical materials.

Coal coke: See **Coke(coal)** below.

Coal consumption: The quantity of coal burned for the generation of electric power (in short tons), including fuel used for maintenance of standby service.

Coal delivered: Coal which has been delivered from the coal supplier to any site belonging to the electric power company.

Coal exports: Amount of U.S. coal shipped to foreign destinations, as reported in the U.S. Department of Commerce, Bureau of Census, "Monthly Report EM 545."

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Coal face: This is the exposed area from which coal is extracted.

Coal financial reporting regions: A geographic classification of areas with coal resources which is used for financial reporting of coal statistics.

- Eastern Region. Consists of the Appalachian Coal Basin. The following comprise the Eastern Region: Alabama, eastern Kentucky, Georgia, Maryland, Mississippi, Ohio, Pennsylvania, Virginia, Tennessee, North Carolina, and West Virginia.
- Midwest Region. Consists of the Illinois and Michigan Coal Basins. The following comprise the Midwest Region: Illinois, Indiana, Michigan, and western Kentucky.
- Western Region. Consists of the Northern Rocky, Southern Rocky, West Coast Coal Basins and Western Interior. The following comprise the Western Region: Alaska, Arizona, Arkansas, California, Colorado, Idaho, Iowa, Kansas, Louisiana, Missouri, Montana, New Mexico, North Dakota, Oklahoma, Oregon, Texas, South Dakota, Utah, Washington, and Wyoming.

Coal fines: Coal with a maximum particle size usually less than one-sixteenth inch and rarely above one-eighth inch.

Coal gas: Substitute natural gas produced synthetically by the chemical reduction of coal at a coal gasification facility.

Coal gasification: The process of converting coal into gas. The basic process involves crushing coal to a powder, which is then heated in the presence of steam and oxygen to produce a gas. The gas is then refined to reduce sulfur and other impurities. The gas can be used as a fuel or processed further and concentrated into chemical or liquid fuel.

Coal grade: This classification refers to coal quality and use.

- **Briquettes** are made from compressed coal dust, with or without a binding agent such as asphalt.
- **Cleaned coal or prepared coal** has been processed to reduce the amount of impurities present and improve the burning characteristics.
- **Compliance coal** is a coal, or a blend of coal, that meets sulfur dioxide emission standards for air quality without the need for flue-gas desulfurization.
- **Culm and silt** are waste materials from preparation plants. In the anthracite region, culm consists of coarse rock fragments containing as much as 30 percent small-sized coal. Silt is a mixture of very fine coal particles (approximately 40 percent) and rock dust that has settled out from waste water from the plants. The terms culm and silt are sometimes used interchangeably and are sometimes called refuse. Culm and silt have a heat value ranging from 8 to 17 million Btu per ton.
- **Low-sulfur coal** generally contains 1 percent or less sulfur by weight. For air quality standards, "low sulfur coal" contains 0.6 pounds or less sulfur per million Btu, which is equivalent to 1.2 pounds of sulfur dioxide per million Btu.
- **Metallurgical coal (or coking coal)** meets the requirements for making coke. It must have a low ash and sulfur content and form a coke that is capable of supporting the charge of iron ore and limestone in a blast furnace. A blend of two or more bituminous coals is usually required to make coke.
- **Pulverized coal** is a coal that has been crushed to a fine dust in a grinding mill. It is blown into the combustion zone of a furnace and burns very rapidly and efficiently.
- **Slack coal** usually refers to bituminous coal one-half inch or smaller in size.
- **Steam coal** refers to coal used in boilers to generate steam to produce electricity or for other purposes.
- **Stoker coal** refers to coal that has been crushed to specific sizes (but not powdered) for burning on a grate in automatic firing equipment.

Coal imports: Amount of foreign coal shipped to the United States, as reported in the U.S. Department of Commerce, Bureau of the Census, "Monthly Report IM 145."

Coal liquefaction: A chemical process that converts coal into clean-burning liquid hydrocarbons, such as synthetic crude oil and methanol.

Coal mining productivity: Coal mining productivity is calculated by dividing total coal production by the total direct labor hours worked by all mine employees.

Coal preparation: The process of sizing and cleaning coal to meet market specifications by removing impurities such as rock, sulfur, etc. It may include crushing, screening, or mechanical cleaning.

Coal-producing regions:

- Appalachian Region. Consists of Alabama, Georgia, Eastern Kentucky, Maryland, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.
- Interior Region (with Gulf Coast). Consists of Arkansas, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Mississippi, Missouri, Oklahoma, Texas, and Western Kentucky.
- Western Region. Consists of Alaska, Arizona, Colorado, Montana, New Mexico, North Dakota, Utah,

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Washington, and Wyoming.

Note: Some States discontinue producing coal as reserves are depleted or as production becomes uneconomic.

Coal producing districts: A classification of coal fields defined in the Bituminous Coal Act of 1937. The districts were originally established to aid in formulating minimum prices of bituminous and subbituminous coal and lignite. Because much statistical information was compiled in terms of these districts, their use for statistical purposes has continued since the abandonment of that legislation in 1943. District 24 was added for the anthracite-producing district in Pennsylvania.

Coal production: The sum of sales, mine consumption, issues to miners, and issues to coke, briquetting, and other ancillary plants at mines. Production data include quantities extracted from surface and underground mines, and normally exclude wastes removed at mines or associated reparation plants.

Coal rank: The classification of coals according to their degree of progressive alteration from lignite to anthracite. In the United States, the standard ranks of coal include lignite, subbituminous coal, bituminous coal, and anthracite and are based on fixed carbon, volatile matter, heating value, and agglomerating (or caking) properties.

Coal sampling: The collection and proper storage and handling of a relatively small quantity of coal for laboratory analysis. Sampling may be done for a wide range of purposes, such as: coal resource exploration and assessment, characterization of the reserves or production of a mine, to characterize the results of coal cleaning processes, to monitor coal shipments or receipts for adherence to coal quality contract specifications, or to subject a coal to specific combustion or reactivity tests related to the customer's intended use. During pre-development phases, such as exploration and resource assessment, sampling typically is from natural outcrops, test pits, old or existing mines in the region, drill cuttings, or drilled cores. Characterization of a mine's reserves or production may use sample collection in the mine, representative cuts from coal conveyors or from handling and loading equipment, or directly from stockpiles or shipments (coal rail cars or barges). Contract specifications rely on sampling from the production flow at the mining or coal handling facility or at the loadout, or from the incoming shipments at the receiver's facility. In all cases, the value of a sample taken depends on its being representative of the coal under consideration, which in turn requires that appropriate sampling procedures be carefully followed.

For coal resource and estimated reserve characterization, appropriate types of samples include:

- **Face channel or channel sample:** a sample taken at the exposed coal in a mine by cutting away any loose or weathered coal then collecting on a clean surface a sample of the coal seam by chopping out a channel of uniform width and depth; a face channel or face sample is taken at or near the working face, the most freshly exposed coal where actual removal and loading of mined coal is taking place. Any partings greater than 3/8 inch and/or mineral concretions greater than 1/2 inch thick and 2 inches in maximum diameter are normally discarded from a channel sample so as better to represent coal that has been mined, crushed, and screened to remove at least gross non-coal materials.
- **Column sample:** a channel or drill core sample taken to represent the entire geologic coalbed; it includes all partings and impurities that may exist in the coalbed.
- **Bench sample:** a face or channel sample taken of just that contiguous portion of a coalbed that is considered practical to mine, also known as a "bench;" For example, bench samples may be taken of minable coal where impure coal that makes up part of the geologic coalbed is likely to be left in the mine, or where thick partings split the coal into two or more distinct minable seams, or where extremely thick coalbeds cannot be recovered by normal mining equipment, so that the coal is mined in multiple passes, or benches, usually defined along natural bedding planes.
- **Composite sample:** a recombined coalbed sample produced by averaging together thickness-weighted coal analyses from partial samples of the coalbed, such as from one or more bench samples, from one or more mine exposures or outcrops where the entire bed could not be accessed in one sample, or from multiple drill cores that were required to retrieve all local sections of a coal seam.

Coal stocks: Coal quantities that are held in storage for future use and disposition. *Note:* When coal data are collected for a particular reporting period (month, quarter, or year), coal stocks are commonly measured as of the last day of this period.

Coal sulfur: Coal sulfur occurs in three forms: organic, sulfate, and pyritic. Organic sulfur is an integral part of the coal matrix and cannot be removed by conventional physical separation. Sulfate sulfur is usually negligible. Pyritic sulfur occurs as the minerals pyrite and marcasite; larger sizes generally can be removed by cleaning the coal.

Coal Synfuel: Coal-based solid fuel that has been processed by a coal synfuel plant; and coal-based fuels such as briquettes, pellets, or extrusions, which are formed from fresh or recycled coal and binding materials.

Coal type: The classification is based on physical characteristics or microscopic constituents. Examples of coal types are banded coal, bright coal, cannel coal, and splint coal. The term is also used to classify coal according to heat and sulfur content. See **Coal grade** above.

Coal zone: A series of laterally extensive and (or) lenticular coal beds and associated strata that arbitrarily can be viewed as a unit. Generally, the coal beds in a coal zone are assigned to the same geologic member or formation.

Code of Federal Regulations: A compilation of the general and permanent rules of the executive departments and agencies of the Federal Government as published in the Federal Register. The code is divided into 50 titles that represent

broad areas subject to Federal regulation. Title 18 contains the FERC regulations.

Cofiring: The process of burning natural gas in conjunction with another fuel to reduce air pollutants.

Cogeneration: The production of electrical energy and another form of useful energy (such as heat or steam) through the sequential use of energy.

Cogeneration system: A system using a common energy source to produce both electricity and steam for other uses, resulting in increased fuel efficiency.

Cogenerator: A generating facility that produces electricity and another form of useful thermal energy (such as heat or steam), used for industrial, commercial, heating, or cooling purposes. To receive status as a qualifying facility (QF) under the Public Utility Regulatory Policies Act (PURPA), the facility must produce electric energy and "another form of useful thermal energy through the sequential use of energy" and meet certain ownership, operating, and efficiency criteria established by the Federal Energy Regulatory Commission (FERC). (See the Code of Federal Regulations, Title 18, Part 292.)

Coincidental demand: The sum of two or more demands that occur in the same time interval.

Coincidental peak load: The sum of two or more peak loads that occur in the same time interval.

Coke (coal): A solid carbonaceous residue derived from low-ash, low-sulfur bituminous coal from which the volatile constituents are driven off by baking in an oven at temperatures as high as 2,000 degrees Fahrenheit so that the fixed carbon and residual ash are fused together. Coke is used as a fuel and as a reducing agent in smelting iron ore in a blast furnace. Coke from coal is grey, hard, and porous and has a heating value of 24.8 million Btu per ton.

Coke (petroleum): A residue high in carbon content and low in hydrogen that is the final product of thermal decomposition in the condensation process in cracking. This product is reported as marketable coke or catalyst coke. The conversion is 5 barrels (of 42 U.S. gallons each) per short ton. Coke from petroleum has a heating value of 6.024 million Btu per barrel.

Coke breeze: The term refers to the fine sizes of coke, usually less than one-half inch, that are recovered from coke plants. It is commonly used for sintering iron ore.

Coke button: A button-shaped piece of coke resulting from standard laboratory tests that indicates the coking or free-swelling characteristics of a coal; expressed in numbers and compared with a standard.

Coke oven gas: The mixture of permanent gases produced by the carbonization of coal in a coke oven at temperatures in excess of 1,000 degrees Celsius.

Coke plants: Plants where coal is carbonized for the manufacture of coke in slot or beehive ovens.

Coking: Thermal refining processes used to produce fuel gas, gasoline blendstocks, distillates, and petroleum coke from the heavier products of atmospheric and vacuum distillation. Includes:

- **Delayed Coking.** A process by which heavier crude oil fractions can be thermally decomposed under conditions of elevated temperatures and pressure to produce a mixture of lighter oils and petroleum coke. The light oils can be processed further in other refinery units to meet product specifications. The coke can be used either as a fuel or in other applications such as the manufacturing of steel or aluminum.
- **Flexicoking.** A thermal cracking process which converts heavy hydrocarbons such as crude oil, tar sands bitumen, and distillation residues into light hydrocarbons. Feedstocks can be any pumpable hydrocarbons including those containing high concentrations of sulfur and metals.
- **Fluid Coking.** A thermal cracking process utilizing the fluidized-solids technique to remove carbon (coke) for continuous conversion of heavy, low-grade oils into lighter products.

Compact fluorescent bulbs: These are also known as "screw-in fluorescent replacements for incandescent" or "screw-ins." Compact fluorescent bulbs combine the efficiency of fluorescent lighting with the convenience of a standard incandescent bulb. There are many styles of compact fluorescent, including exit light fixtures and floodlights (lamps containing reflectors). Many screw into a standard light socket, and most produce a similar color of light as a standard incandescent bulb. Compact fluorescent bulbs come with ballasts that are electronic (lightweight, instant, no-flicker starting, and 10 to 15% more efficient) or magnetic (much heavier and slower starting). Other types of compact fluorescent bulbs include adaptive circulation and PL and SL lamps and ballasts. Compact fluorescent bulbs are designed for residential uses; they are also used in table lamps, wall sconces, and hall and ceiling fixtures of hotels, motels, hospitals, and other types of commercial buildings with residential-type applications.

Cooling degree-days: A measure of how warm a location is over a period of time relative to a base temperature, most commonly specified as 65 degrees Fahrenheit. The measure is computed for each day by subtracting the base temperature (65 degrees) from the average of the day's high and low temperatures, with negative values set equal to zero. Each day's cooling degree-days are summed to create a cooling degree-day measure for a specified reference period. Cooling degree-days are used in energy analysis as an indicator of air conditioning energy requirements or use.

Crude oil: A mixture of hydrocarbons that exists in liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. Depending upon the characteristics of the crude

stream, it may also include:

1. Small amounts of hydrocarbons that exist in gaseous phase in natural underground reservoirs but are liquid at atmospheric pressure after being recovered from oil well (casinghead) gas in lease separators and are subsequently commingled with the crude stream without being separately measured. Lease condensate recovered as a liquid from natural gas wells in lease or field separation facilities and later mixed into the crude stream is also included;
2. Small amounts of nonhydrocarbons produced with the oil, such as sulfur and various metals;
3. Drip gases, and liquid hydrocarbons produced from tar sands, oil sands, gilsonite, and oil shale.

Liquids produced at natural gas processing plants are excluded. Crude oil is refined to produce a wide array of petroleum products, including heating oils; gasoline, diesel and jet fuels; lubricants; asphalt; ethane, propane, and butane; and many other products used for their energy or chemical content.

Crude oil acquisitions (unfinished oil acquisitions): The volume of crude oil either

- acquired by the respondent for processing for his own account in accordance with accounting procedures generally accepted and consistently and historically applied by the refiner concerned, or
- in the case of a processing agreement, delivered to another refinery for processing for the respondent's own account.

Crude oil that has not been added by a refiner to inventory and that is thereafter sold or otherwise disposed of without processing for the account of that refiner shall be deducted from its crude oil purchases at the time when the related cost is deducted from refinery inventory in accordance with accounting procedures generally applied by the refiner concerned. Crude oil processed by the respondent for the account of another is not a crude oil acquisition.

Crude oil f.o.b. price: The crude oil price actually charged at the oil producing country's port of loading. Includes deductions for any rebates and discounts or additions of premiums, where applicable. It is the actual price paid with no adjustment for credit terms.

Crude oil input: The total crude oil put into processing units at refineries.

Crude oil landed cost: The price of crude oil at the port of discharge, including charges associated with purchasing, transporting, and insuring a cargo from the purchase point to the port of discharge. The cost does not include charges incurred at the discharge port (e.g., import tariffs or fees, wharfage charges, and demurrage).

Crude oil less lease condensate: A mixture of hydrocarbons that exists in liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. Such hydrocarbons as lease condensate and natural gasoline recovered as liquids from natural gas wells in lease or field separation facilities and later mixed into the crude stream are excluded. Depending upon the characteristics of the crude stream, crude oil may also include:

1. Small amounts of hydrocarbons that exist in gaseous phase in natural underground reservoirs but are liquid at atmospheric pressure after being recovered from oil well (casinghead) gas in lease separators and are subsequently commingled with the crude stream without being separately measured;
2. Small amounts of nonhydrocarbons produced with the oil, such as sulfur and various metals.

Crude oil losses: Represents the volume of crude oil reported by petroleum refineries as being lost in their operations. These losses are due to spills, contamination, fires, etc., as opposed to refining processing losses.

Crude oil production: The volume of crude oil produced from oil reservoirs during given periods of time. The amount of such production for a given period is measured as volumes delivered from lease storage tanks (i.e., the point of custody transfer) to pipelines, trucks, or other media for transport to refineries or terminals with adjustments for (1) net differences between opening and closing lease inventories, and (2) basic sediment and water (BS&W).

Crude oil qualities: Refers to two properties of crude oil, the sulfur content, and API gravity, which affect processing complexity and product characteristics.

Crude oil refinery input: The total crude oil put into processing units at refineries.

Crude oil stocks: Stocks of crude oil and lease condensate held at refineries, in pipelines, at pipeline terminals, and on leases.

Crude oil used directly: Crude oil consumed as fuel by crude oil pipelines and on crude oil leases.

Crude oil, refinery receipts: Receipts of domestic and foreign crude oil at a refinery. Includes all crude oil in transit except crude oil in transit by pipeline. Foreign crude oil is reported as a receipt only after entry through customs. Crude oil of foreign origin held in bonded storage is excluded.

Dealer tank wagon (DTW) sales: Wholesale sales of gasoline priced on a delivered basis to a retail outlet.

Dedicated reserves: The volume of recoverable, salable gas reserves committed to, controlled by, or possessed by the reporting pipeline company and used for acts and services for which both the seller and the company have received certificate authorization from the Federal Energy Regulatory Commission (FERC). Reserves include both company-owned reserves (including owned gas in underground storage), reserves under contract from independent producers, and short-term and emergency supplies from the intrastate market. Gas volumes under contract from other interstate pipelines are

not included as reserves, but may constitute part or all of a company's gas supply.

Deliverability: Represents the number of future years during which a pipeline company can meet its annual requirements for its presently certificated delivery capacity from presently committed sources of supply. The availability of gas from these sources of supply shall be governed by the physical capabilities of these sources to deliver gas by the terms of existing gas-purchase contracts, and by limitations imposed by State or Federal regulatory agencies.

Delivered cost: The cost of fuel, including the invoice price of fuel, transportation charges, taxes, commissions, insurance, and expenses associated with leased or owned equipment used to transport the fuel.

Delivered energy: The amount of energy delivered to the site (building); no adjustment is made for the fuels consumed to produce electricity or district sources. This is also referred to as net energy.

Delivered (gas): The physical transfer of natural, synthetic, and/or supplemental gas from facilities operated by the responding company to facilities operated by others or to consumers.

Deliveries (electric): Energy generated by one system and delivered to another system through one or more transmission lines.

demand: See [Energy demand](#).

Demonstrated reserve base (coal): A collective term for the sum of coal in both measured and indicated resource categories of reliability, representing 100 percent of the in-place coal in those categories as of a certain date. Includes beds of bituminuous coal and anthracite 28 or more inches thick and beds of subbituminuous coal 60 or more inches thick that can occur at depths of up to 1,000 feet. Includes beds of lignite 60 or more inches thick that can be surface mined. Includes also thinner and/or deeper beds that presently are being mined or for which there is evidence that they could be mined commercially at a given time. Represents that portion of the identified coal resource from which reserves are calculated.

Demonstrated resources: Same qualifications as identified resources, but include measured and indicated degrees of geologic assurance and excludes the inferred.

Diesel-electric plant: A generating station that uses diesel engines to drive its electric generators.

Diesel fuel: A fuel composed of distillates obtained in petroleum refining operation or blends of such distillates with residual oil used in motor vehicles. The boiling point and specific gravity are higher for diesel fuels than for gasoline.

Diesel fuel system: Diesel engines are internal combustion engines that burn diesel oil rather than gasoline. Injectors are used to spray droplets of diesel oil into the combustion chambers, at or near the top of the compression stroke. Ignition follows due to the very high temperature of the compressed intake air, or to the use of "glow plugs," which retain heat from previous ignitions (spark plugs are not used). Diesel engines are generally more fuel-efficient than gasoline engines but must be stronger and heavier because of high compression ratios.

Distillate fuel oil: A general classification for one of the petroleum fractions produced in conventional distillation operations. It includes diesel fuels and fuel oils. Products known as No. 1, No. 2, and No. 4 diesel fuel are used in on-highway diesel engines, such as those in trucks and automobiles, as well as off-highway engines, such as those in railroad locomotives and agricultural machinery. Products known as No. 1, No. 2, and No. 4 fuel oils are used primarily for space heating and electric power generation.

No. 1 Distillate: A light petroleum distillate that can be used as either a diesel fuel (see **No. 1 Diesel Fuel**) or a fuel oil. See **No. 1 Fuel Oil**.

- **No. 1 Diesel Fuel:** A light distillate fuel oil that has distillation temperatures of 550 degrees Fahrenheit at the 90-percent point and meets the specifications defined in ASTM Specification D 975. It is used in high-speed diesel engines, such as those in city buses and similar vehicles. See **No. 1 Distillate** above.

- **No. 1 Fuel Oil:** A light distillate fuel oil that has distillation temperatures of 400 degrees Fahrenheit at the 10-percent recovery point and 550 degrees Fahrenheit at the 90-percent point and meets the specifications defined in ASTM Specification D 396. It is used primarily as fuel for portable outdoor stoves and portable outdoor heaters. See **No. 1 Distillate** above.

No. 2 Distillate: A petroleum distillate that can be used as either a diesel fuel (see **No. 2 Diesel Fuel** definition below) or a fuel oil. See **No. 2 Fuel oil** below.

- **No. 2 Diesel Fuel:** A fuel that has distillation temperatures of 500 degrees Fahrenheit at the 10-percent recovery point and 640 degrees Fahrenheit at the 90-percent recovery point and meets the specifications defined in ASTM Specification D 975. It is used in high-speed diesel engines, such as those in railroad locomotives, trucks, and automobiles. See **No. 2 Distillate** above.
- **Low Sulfur No. 2 Diesel Fuel:** No. 2 diesel fuel that has a sulfur level no higher than 0.05 percent by weight. It is used primarily in motor vehicle diesel engines for on-highway use.
- **High Sulfur No. 2 Diesel Fuel:** No. 2 diesel fuel that has a sulfur level above 0.05 percent by weight.
- **No. 2 Fuel oil (Heating Oil):** A distillate fuel oil that has distillation temperatures of 400 degrees Fahrenheit at the 10-percent recovery point and 640 degrees Fahrenheit at the 90-percent recovery point and meets the

specifications defined in ASTM Specification D 396. It is used in atomizing type burners for domestic heating or for moderate capacity commercial/industrial burner units. See **No. 2 Distillate** above.

No. 4 Fuel: A distillate fuel oil made by blending distillate fuel oil and residual fuel oil stocks. It conforms with ASTM Specification D 396 or Federal Specification VV-F-815C and is used extensively in industrial plants and in commercial burner installations that are not equipped with preheating facilities. It also includes No. 4 diesel fuel used for low- and medium-speed diesel engines and conforms to ASTM Specification D 975.

No. 4 Diesel Fuel and No. 4 Fuel Oil: See **No. 4 Fuel** above.

Dual fuel vehicle (1): A motor vehicle that is capable of operating on an alternative fuel and on gasoline or diesel fuel. These vehicles have at least two separate fuel systems which inject each fuel simultaneously into the engine combustion chamber.

Dual fuel vehicle (2): A motor vehicle that is capable of operating on an alternative fuel and on gasoline or diesel fuel. This term is meant to represent all such vehicles whether they operate on the alternative fuel and gasoline/diesel simultaneously (e.g., flexible-fuel vehicles) or can be switched to operate on gasoline/diesel or an alternative fuel (e.g., bi-fuel vehicles).

Dual-fired unit: A generating unit that can produce electricity using two or more input fuels. In some of these units, only the primary fuel can be used continuously; the alternate fuel(s) can be used only as a start-up fuel or in emergencies.

EIA: The Energy Information Administration. An independent agency within the U.S. Department of Energy that develops surveys, collects energy data, and analyzes and models energy issues. The Agency must meet the requests of Congress, other elements within the Department of Energy, Federal Energy Regulatory Commission, the Executive Branch, its own independent needs, and assist the general public, or other interest groups, without taking a policy position. See more information about EIA at <http://www.eia.doe.gov/neic/aboutEIA/aboutus.htm>

Electric generation: See [Gross generation](#) and [Net generation](#).

Electric generation industry: Stationary and mobile generating units that are connected to the electric power grid and can generate electricity. The electric generation industry includes the "electric power sector" (utility generators and independent power producers) and industrial and commercial power generators, including combined-heat-and-power producers, but excludes units at single-family dwellings.

Electric generator: A facility that produces only electricity, commonly expressed in kilowatthours (kWh) or megawatthours (MWh). Electric generators include electric utilities and independent power producers.

Electric hybrid vehicle: An electric vehicle that either (1) operates solely on electricity, but contains an internal combustion motor that generates additional electricity (series hybrid); or (2) contains an electric system and an internal combustion system and is capable of operating on either system (parallel hybrid).

Electric industry reregulation: The design and implementation of regulatory practices to be applied to the remaining traditional utilities after the electric power industry has been restructured. Reregulation applies to those entities that continue to exhibit characteristics of a natural monopoly. Reregulation could employ the same or different regulatory practices as those used before restructuring.

Electric industry restructuring: The process of replacing a monopolistic system of electric utility suppliers with competing sellers, allowing individual retail customers to choose their supplier but still receive delivery over the power lines of the local utility. It includes the reconfiguration of vertically-integrated electric utilities.

Electric motor vehicle: A motor vehicle powered by an electric motor that draws current from rechargeable storage batteries, fuel cells, photovoltaic arrays, or other sources of electric current.

Electric power: The rate at which electric energy is transferred. Electric power is measured by capacity and is commonly expressed in megawatts (MW).

Electric power grid: A system of synchronized power providers and consumers connected by transmission and distribution lines and operated by one or more control centers. In the continental United States, the electric power grid consists of three systems: the Eastern Interconnect, the Western Interconnect, and the Texas Interconnect. In Alaska and Hawaii, several systems encompass areas smaller than the State (e.g., the interconnect serving Anchorage, Fairbanks, and the Kenai Peninsula; individual islands).

Electric power plant: A station containing prime movers, electric generators, and auxiliary equipment for converting mechanical, chemical, and/or fission energy into electric energy.

Electric power sector: An energy-consuming sector that consists of electricity only and combined heat and power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public--i.e., North American Industry Classification System 22 plants. See also **Combined heat and power (CHP) plant** and **Electricity only plant**.

Electric power system: An individual electric power entity--a company; an electric cooperative; a public electric supply corporation as the Tennessee Valley Authority; a similar Federal department or agency such as the Bonneville Power Administration; the Bureau of Reclamation or the Corps of Engineers; a municipally owned electric department offering service to the public; or an electric public utility district (a "PUD"); also a jointly owned electric supply project such as the Keystone.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Emergency: The failure of an electric power system to generate or deliver electric power as normally intended, resulting in the cutoff or curtailment of service.

Emergency backup generation: The use of electric generators only during interruptions of normal power supply.

Emergency energy: Electric energy provided for a limited duration, intended only for use during emergency conditions.

Energy reserves: Estimated quantities of energy sources that are demonstrated to exist with reasonable certainty on the basis of geologic and engineering data (proved reserves) or that can reasonably be expected to exist on the basis of geologic evidence that supports projections from proved reserves (probable/indicated reserves). Knowledge of the location, quantity, and grade of probable/indicated reserves is generally incomplete or much less certain than it is for proved energy reserves. *Note:* This term is equivalent to "Demonstrated Reserves" as defined in the resource/reserve classification contained in the U.S. Geological Survey Circular 831, 1980. Demonstrated reserves include measured and indicated reserves but exclude inferred reserves.

Energy service provider: An energy entity that provides service to a retail or end-use customer.

Energy source: Any substance or natural phenomenon that can be consumed or transformed to supply heat or power. Examples include petroleum, coal, natural gas, nuclear, biomass, electricity, wind, sunlight, geothermal, water movement, and hydrogen in fuel cells.

Energy supply: Energy made available for future disposition. Supply can be considered and measured from the point of view of the energy provider or the receiver.

Energy supplier: Fuel companies supplying electricity, natural gas, fuel oil, kerosene, or LPG (liquefied petroleum gas) to the household.

Federal Energy Regulatory Commission (FERC): The Federal agency with jurisdiction over interstate electricity sales, wholesale electric rates, hydroelectric licensing, natural gas pricing, oil pipeline rates, and gas pipeline certification. FERC is an independent regulatory agency within the Department of Energy and is the successor to the Federal Power Commission.

Federal Power Act: Enacted in 1920, and amended in 1935, the Act consists of three parts. The first part incorporated the Federal Water Power Act administered by the former Federal Power Commission, whose activities were confined almost entirely to licensing non-Federal hydroelectric projects. Parts II and III were added with the passage of the Public Utility Act. These parts extended the Act's jurisdiction to include regulating the interstate transmission of electrical energy and rates for its sale as wholesale in interstate commerce. The Federal Energy Regulatory Commission is now charged with the administration of this law.

Federal Power Commission (FPC): The predecessor agency of the Federal Energy Regulatory Commission. The Federal Power Commission was created by an Act of Congress under the Federal Water Power Act on June 10, 1920. It was charged originally with regulating the electric power and natural gas industries. It was abolished on September 30, 1977, when the Department of Energy was created. Its functions were divided between the Department of Energy and the Federal Energy Regulatory Commission, an independent regulatory agency.

Federal region: In a Presidential directive issued in 1969, various Federal agencies (among them the currently designated Department of Health and Human Services, the Department of Labor, the Office of Economic Opportunity, and the Small Business Administration) were instructed to adopt a uniform field system of 10 geographic regions with common boundaries and headquarters cities. The action was taken to correct the evolution of fragmented Federal field organization structures that each agency or component created independently, usually with little reference to other agencies' arrangements. Most Federal domestic agencies or their components have completed realignments and relocations to conform to the Standard Federal Administration Regions (SFARs).

Finished leaded gasoline: Contains more than 0.05 gram of lead per gallon or more than 0.005 gram of phosphorus per gallon. Premium and regular grades are included, depending on the octane rating. Includes leaded gasohol. Blendstock is excluded until blending has been completed. Alcohol that is to be used in the blending of gasohol is also excluded.

Finished motor gasoline: See [motor gasoline \(finished\)](#).

Fleet vehicle: Any motor vehicle a company owns or leases that is in the normal operations of a company. Vehicles which are used in the normal operation of a company, but are owned by company employees are not fleet vehicles. If a company provides services in addition to providing natural gas, only those vehicles that are used by the natural gas provider portion of a company should be counted as fleet vehicles. Vehicles that are considered "off-road" (e.g., farm or construction vehicles) or demonstration vehicles are not to be counted as fleet vehicles. Fleet vehicles include gasoline/diesel powered vehicles and alternative-fuel vehicles.

Flexible fuel vehicle: A vehicle that can operate on

- (1) alternative fuels (such as M85 or E85)
- (2) 100-percent petroleum-based fuels
- (3) any mixture of an alternative fuel (or fuels) and a petroleum-based fuel.

Flexible fuel vehicles have a single fuel system to handle alternative and petroleum-based fuels. Flexible fuel vehicle and variable fuel vehicle are synonymous terms.

Fluorescent lamp: A glass enclosure in which light is produced when electricity is passed through mercury vapor inside

the enclosure. The electricity creates a radiation discharge that strikes a coating on the inside surface of the enclosure, causing the coating to glow. *Note:* Traditional fluorescent lamps are usually straight or circular white glass tubes used in fixtures specially designed for them. A newer type of fluorescent lamp, the compact fluorescent lamp, takes up much less room, comes in many differently-shaped configurations, and is designed to be used in some fixtures originally intended to house incandescent lamps.

Fluorescent light bulbs: These are usually long, narrow, white tubes made of glass coated on the inside with fluorescent material, which is connected to a fixture at both ends of the light bulb; some are circular tubes. The light bulb produces light by passing electricity through mercury vapor, which causes the fluorescent coating to glow or fluoresce.

Fluorescent lighting other than compact fluorescent bulbs: In fluorescent lamps, energy is converted to light by using an electric charge to "excite" gaseous atoms within a fluorescent tube. Common types are "cool white," "warm white," etc. Special energy efficient fluorescent lights have been developed that produce the same amount of light while consuming less energy. *Note:* for definition of **compact fluorescent bulbs**, go to

http://www.eia.doe.gov/glossary/glossary_c.htm#compact_bulbs.

Fossil fuel: An energy source formed in the earth's crust from decayed organic material. The common fossil fuels are petroleum, coal, and natural gas.

Fossil-fuel electric generation: Electric generation in which the prime mover is a turbine rotated by high-pressure steam produced in a boiler by heat from burning fossil fuels.

Fossil fuel plant: A plant using coal, petroleum, or gas as its source of energy.

Fossil fuel steam-electric power plant: An electricity generation plant in which the prime mover is a turbine rotated by high-pressure steam produced in a boiler by heat from burning fossil fuels.

Fuel: Any material substance that can be consumed to supply heat or power. Included are petroleum, coal, and natural gas (the fossil fuels), and other consumable materials, such as uranium, biomass, and hydrogen.

Fuel cell: A device capable of generating an electrical current by converting the chemical energy of a fuel (e.g., [hydrogen](#)) directly into electrical energy. Fuel cells differ from conventional electrical cells in that the active materials such as fuel and oxygen are not contained within the cell but are supplied from outside. It does not contain an intermediate heat cycle, as do most other electrical generation techniques.

Fuel cycle: The entire set of sequential processes or stages involved in the utilization of fuel, including extraction, transformation, transportation, and combustion. Emissions generally occur at each stage of the fuel cycle.

Fuel efficiency: See [Miles per gallon](#).

Fuel emergencies: An emergency that exists when supplies of fuels or hydroelectric storage for generation are at a level or estimated to be at a level that would threaten the reliability or adequacy of bulk electric power supply. The following factors should be taken into account to determine that a fuel emergency exists:

1. Fuel stock or hydroelectric project water storage levels are 50 percent or less of normal for that particular time of the year and a continued downward trend in fuel stock or hydroelectric project water storage level is estimated; or
2. Unscheduled dispatch or emergency generation is causing an abnormal use of a particular fuel type, such that the future supply of stocks of that fuel could reach a level that threatens the reliability or adequacy of bulk electric power supply.

Fuel ethanol (C₂H₅OH): An anhydrous denatured aliphatic alcohol intended for gasoline blending as described in [Oxygenates](#) definition.

Fuel injection: A fuel delivery system whereby gasoline is pumped to one or more fuel injectors under high pressure. The fuel injectors are valves that, at the appropriate times, open to allow fuel to be sprayed or atomized into a throttle bore or into the intake manifold ports. The fuel injectors are usually solenoid operated valves under the control of the vehicle's on-board computer (thus the term "electronic fuel injection"). The fuel efficiency of fuel injection systems is less temperature-dependent than carburetor systems. Diesel engines always use injectors.

Fuel oil: A liquid petroleum product less volatile than gasoline, used as an energy source. Fuel oil includes distillate fuel oil (No. 1, No. 2, and No. 4), and residual fuel oil (No. 5 and No. 6).

Fuel oil supplier: See **Energy supplier**.

Fuel switching capability: The short-term capability of a manufacturing establishment to have used substitute energy sources in place of those actually consumed. Capability to use substitute energy sources means that the establishment's combustors (for example, boilers, furnaces, ovens, and blast furnaces) had the machinery or equipment either in place or available for installation so that substitutions could actually have been introduced within 30 days without extensive modifications. Fuel-switching capability does not depend on the relative prices of energy sources; it depends only on the characteristics of the equipment and certain legal constraints.

Gas plant operator: Any firm, including a gas plant owner, which operates a gas plant and keeps the gas plant records. A gas plant is a facility in which natural gas liquids are separated from natural gas or in which natural gas liquids are fractionated or otherwise separated into natural gas liquid products or both.

Gas processing unit: A facility designed to recover natural gas liquids from a stream of natural gas that may or may not have passed through lease separators and/or field separation facilities. Another function of natural gas processing plants is to control the quality of the processed natural gas stream. Cycling plants are considered natural gas processing plants.

Gas to liquids (GTL): A process that combines the carbon and hydrogen elements in natural gas molecules to make synthetic liquid petroleum products, such as diesel fuel.

Gas turbine plant: A plant in which the prime mover is a gas turbine. A gas turbine consists typically of an axial-flow air compressor and one or more combustion chambers where liquid or gaseous fuel is burned and the hot gases are passed to the turbine and where the hot gases expand drive the generator and are then used to run the compressor.

Gas well: A well completed for production of natural gas from one or more gas zones or reservoirs. Such wells contain no completions for the production of crude oil.

Gas well productivity: Derived annually by dividing gross natural gas withdrawals from gas wells by the number of producing gas wells on December 31 and then dividing the quotient by the number of days in the year.

Gasification: A method for converting coal, petroleum, biomass, wastes, or other carbon-containing materials into a gas that can be burned to generate power or processed into chemicals and fuels.

Gasohol: A blend of finished motor gasoline containing alcohol (generally ethanol but sometimes methanol) at a concentration between 5.7 percent and 10 percent by volume. Also see [Oxygenates](#).

Gasoline: See [Motor gasoline \(finished\)](#).

Gasoline blending components: Naphthas which will be used for blending or compounding into finished aviation or motor gasoline (e.g., straight-run gasoline, alkylate, reformate, benzene, toluene, and xylene). Excludes oxygenates (alcohols, ethers), butane, and pentanes plus.

Gasoline grades: The classification of gasoline by octane ratings. Each type of gasoline (conventional, oxygenated, and reformulated) is classified by three grades - Regular, Midgrade, and Premium. *Note:* Gasoline sales are reported by grade in accordance with their classification at the time of sale. In general, automotive octane requirements are lower at high altitudes. Therefore, in some areas of the United States, such as the Rocky Mountain States, the octane ratings for the gasoline grades may be 2 or more octane points lower.

- **Regular gasoline:** Gasoline having an antiknock index, i.e., octane rating, greater than or equal to 85 and less than 88. *Note:* Octane requirements may vary by altitude.
- **Midgrade gasoline:** Gasoline having an antiknock index, i.e., octane rating, greater than or equal to 88 and less than or equal to 90. *Note:* Octane requirements may vary by altitude.
- **Premium gasoline:** Gasoline having an antiknock index, i.e., octane rating, greater than 90. *Note:* Octane requirements may vary by altitude. s or fluids at various depths beneath the surface of the earth. The energy is extracted by drilling and/or pumping.

Gasoline motor, (leaded): Contains more than 0.05 grams of lead per gallon or more than 0.005 grams of phosphorus per gallon. The actual lead content of any given gallon may vary. Premium and regular grades are included, depending on the octane rating. Includes leaded gasohol. Blendstock is excluded until blending has been completed. Alcohol that is to be used in the blending of gasohol is also excluded.

Gate station: Location where the pressure of natural gas being transferred from the transmission system to the distribution system is lowered for transport through small diameter, low pressure pipelines.

Generating facility: An existing or planned location or site at which electricity is or will be produced.

Generating station: A station that consists of electric generators and auxiliary equipment for converting mechanical, chemical, or nuclear energy into electric energy.

Generating unit: Any combination of physically connected generators, reactors, boilers, combustion turbines, and other prime movers operated together to produce electric power.

Generation: The process of producing electric energy by transforming other forms of energy; also, the amount of electric energy produced, expressed in kilowatthours.

Generation company: An entity that owns or operates generating plants. The generation company may own the generation plants or interact with the short-term market on behalf of plant owners.

Generator capacity: The maximum output, commonly expressed in megawatts (MW), that generating equipment can supply to system load, adjusted for ambient conditions.

Generator nameplate capacity (installed): The maximum rated output of a generator, prime mover, or other electric power production equipment under specific conditions designated by the manufacturer. Installed generator nameplate capacity is commonly expressed in megawatts (MW) and is usually indicated on a nameplate physically attached to the generator.

Geothermal energy: Hot water or steam extracted from geothermal reservoirs in the earth's crust. Water or steam extracted from geothermal reservoirs can be used for geothermal heat pumps, water heating, or electricity generation.

Geothermal plant: A plant in which the prime mover is a steam turbine. The turbine is driven either by steam produced

from hot water or by natural steam that derives its energy from heat found in rock

Heat pump: Heating and/or cooling equipment that, during the heating season, draws heat into a building from outside and, during the cooling season, ejects heat from the building to the outside. Heat pumps are vapor-compression refrigeration systems whose indoor/outdoor coils are used reversibly as condensers or evaporators, depending on the need for heating or cooling.

Heat pump (air source): An air-source heat pump is the most common type of heat pump. The heat pump absorbs heat from the outside air and transfers the heat to the space to be heated in the heating mode. In the cooling mode the heat pump absorbs heat from the space to be cooled and rejects the heat to the outside air. In the heating mode when the outside air approaches 32°F or less, air-source heat pumps lose efficiency and generally require a back-up (resistance) heating system.

Heat pump (geothermal): A heat pump in which the refrigerant exchanges heat (in a heat exchanger) with a fluid circulating through an earth connection medium (ground or ground water). The fluid is contained in a variety of loop (pipe) configurations depending on the temperature of the ground and the ground area available. Loops may be installed horizontally or vertically in the ground or submersed in a body of water.

Heat pump efficiency: The efficiency of a heat pump, that is, the electrical energy to operate it, is directly related to temperatures between which it operates. Geothermal heat pumps are more efficient than conventional heat pumps or air conditioners that use the outdoor air since the ground or ground water a few feet below the earth's surface remains relatively constant throughout the year. It is more efficient in the winter to draw heat from the relatively warm ground than from the atmosphere where the air temperature is much colder, and in summer transfer waste heat to the relatively cool ground than to hotter air. Geothermal heat pumps are generally more expensive (\$2,000-\$5,000) to install than outside air heat pumps. However, depending on the location geothermal heat pumps can reduce energy consumption (operating cost) and correspondingly, emissions by more than 20 percent compared to high-efficiency outside air heat pumps. Geothermal heat pumps also use the waste heat from air-conditioning to provide free hot water heating in the summer.

Heating degree-days (HDD): A measure of how cold a location is over a period of time relative to a base temperature, most commonly specified as 65 degrees Fahrenheit. The measure is computed for each day by subtracting the average of the day's high and low temperatures from the base temperature (65 degrees), with negative values set equal to zero. Each day's heating degree-days are summed to create a heating degree-day measure for a specified reference period. Heating degree-days are used in energy analysis as an indicator of space heating energy requirements or use.

Heating equipment: Any equipment designed and/or specifically used for heating ambient air in an enclosed space. Common types of heating equipment include: central warm air furnace, heat pump, plug-in or built-in room heater, boiler for steam or hot water heating system, heating stove, and fireplace. *Note:* A cooking stove in a housing unit is sometimes reported as heating equipment, even though it was built for preparing food.

Housing unit: A house, an apartment, a group of rooms, or a single room if it is either occupied or intended for occupancy as separate living quarters by a family, an individual, or a group of one to nine unrelated persons. Separate living quarters means the occupants (1) live and eat separately from other persons in the house or apartment and (2) have direct access from the outside of the buildings or through a common hall—that is, they can get to it without going through someone else's living quarters. Housing units do not include group quarters such as prisons or nursing homes where ten or more unrelated persons live. A common dining area used by residents is an indication of group quarters. Hotel and motel rooms are considered housing units if occupied as the usual or permanent place of residence.

Incandescent lamp: A glass enclosure in which light is produced when a tungsten filament is electrically heated so that it glows. Much of the energy is converted into heat; therefore, this class of lamp is a relatively inefficient source of light. Included in this category are the familiar screw-in light bulbs, as well as somewhat more efficient lamps, such as tungsten halogen lamps, reflector or R-lamps, parabolic aluminized reflector (PAR) lamps, and ellipsoidal reflector (ER) lamps.

Incandescent light bulbs, including regular or energy-efficient light bulbs: An incandescent bulb is a type of electric light in which light is produced by a filament heated by electric current. The most common example is the type you find in most table and floor lamps. In commercial buildings, incandescent lights are used for display lights in retail stores, hotels and motels. This includes the very small, high-intensity track lights used to display merchandise or provide spot illumination in restaurants. Energy efficient light bulbs, known as "watt-savers," use less energy than a standard incandescent bulb. "Long-life" bulbs, bulbs that last longer than standard incandescent but produce considerably less light, are not considered energy-efficient bulbs. This category also includes halogen lamps. Halogen lamps are a special type of incandescent lamp containing halogen gas to produce a brighter, whiter light than standard incandescent. Halogen lamps come in three styles: bulbs, models with reflectors, and infrared models with reflectors. Halogen lamps are especially suited to recessed or "canned fixtures," track lights, and outdoor lights.

Incentives demand-Side Management (DSM) program assistance: This DSM program assistance offers monetary or non-monetary awards to encourage consumers to buy energy-efficient equipment and to participate in programs designed to reduce energy usage. Examples of incentives are zero or low-interest loans, rebates, and direct installation of low cost measures, such as water heater wraps or duct work for distributing the cool air; the units condition air only in the room or areas where they are located.

Incremental effects: The annual changes in energy use (measured in megawatthours) and peak load (measured in

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

kilowatts) caused by new participants in existing DSM (demand-Side Management) programs and all participants in new DSM programs during a given year. Reported Incremental Effects are annualized to indicate the program effects that would have occurred had these participants been initiated into the program on January 1 of the given year. Incremental effects are not simply the Annual Effects of a given year minus the Annual Effects of the prior year, since these net effects would fail to account for program attrition, equipment degradation, building demolition, and participant dropouts. Please note that Incremental Effects are not a monthly disaggregate of the Annual Effects, but are the total year's effects of only the new participants and programs for that year.

Incremental energy costs: The additional cost of producing and/or transmitting electric energy above some previously determined base cost.

Independent power producer: A corporation, person, agency, authority, or other legal entity or instrumentality that owns or operates facilities for the generation of electricity for use primarily by the public, and that is not an **electric utility**.

Independent system operator (ISO): An independent, Federally regulated entity established to coordinate regional transmission in a non-discriminatory manner and ensure the safety and reliability of the electric system.

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Indian coal lease: A lease granted to a mining company to produce coal from Indian lands in exchange for royalties and other revenues; obtained by direct negotiation with Indian tribal authorities, but subject to approval and administration by the U.S. Department of the Interior.

Indicated reserves: See [Probable energy reserves](#).

Indicated resources, coal: Coal for which estimates of the rank, quality, and quantity are based partly on sample analyses and measurements and partly on reasonable geologic projections. Indicated resources are computed partly from specified measurements and partly from projection of visible data for a reasonable distance on the basis of geologic evidence. The points of observation are 1/2 to 1-1/2 miles apart. Indicated coal is projected to extend as a 1/2-mile-wide belt that lies more than 1/4 mile from the outcrop, points of observation, or measurement.

Indirect cost: Costs not directly related to mining or milling operations, such as overhead, insurance, security, office expenses, property taxes, and similar administrative expenses.

Insulation: Any material or substance that provides a high resistance to the flow of heat from one surface to another. The different types include blanket or batt, foam, or loose fill, which are used to reduce heat transfer by conduction. Dead air space is an insulating medium in storm windows and storms as it reduces passage of heat through conduction and convection. Reflective materials are used to reduce heat transfer by radiation.

Insulation around heating and/or cooling ducts: Extra insulation around the heating and/or cooling ducts intended to reduce the loss of hot or cold air as it travels to different parts of the residence.

Insulation around hot-water pipes: Wrapping of insulating material around hot-water pipes to reduce the loss of heat through the pipes.

Insulation around water heater: Blanket insulation wrapped around the water heater to reduce loss of heat. To qualify under this definition, this wrapping must be in addition to any insulation provided by the manufacturer.

Insulator: A material that is a very poor conductor of electricity. The insulating material is usually a ceramic or fiberglass when used in the transmission line and is designed to support a conductor physically and to separate it electrically from other conductors and supporting material.

Intermediate grade gasoline: A grade of unleaded gasoline with an octane rating intermediate between "regular" and "premium." Octane boosters are added to gasolines to control engine pre-ignition or "knocking" by slowing combustion rates.

Intermediate load (electric system): The range from base load to a point between base load and peak. This point may be the midpoint, a percent of the peak load, or the load over a specified time period.

Intermittent electric generator or intermittent resource: An electric generating plant with output controlled by the natural variability of the energy resource rather than dispatched based on system requirements. Intermittent output usually results from the direct, non-stored conversion of naturally occurring energy fluxes such as solar energy, wind energy, or the energy of free-flowing rivers (that is, run-of-river hydroelectricity).

Internal Collector Storage (ICS): A solar thermal collector in which incident solar radiation is absorbed by the storage medium.

Internal combustion plant: A plant in which the prime mover is an internal combustion engine. An internal combustion engine has one or more cylinders in which the process of combustion takes place, converting energy released from the rapid burning of a fuel-air mixture into mechanical energy. Diesel or gas-fired engines are the principal types used in electric plants. The plant is usually operated during periods of high demand for electricity.

Interruptible gas: Gas sold to customers with a provision that permits curtailment or cessation of service at the discretion

of the distributing company under certain circumstances, as specified in the service contract.

Interruptible load: This demand-Side Management category represents the consumer load that, in accordance with contractual arrangements, can be interrupted at the time of annual peak load by the action of the consumer at the direct request of the system operator. This type of control usually involves large-volume commercial and industrial consumers. Interruptible Load does not include Direct Load Control.

Interruptible or curtailable rate: A special electricity or natural gas arrangement under which, in return for lower rates, the customer must either reduce energy demand on short notice or allow the electric or natural gas utility to temporarily cut off the energy supply for the utility to maintain service for higher priority users. This interruption or reduction in demand typically occurs during periods of high demand for the energy (summer for electricity and winter for natural gas).

Interruptible power: Power and usually the associated energy made available by one utility to another. This transaction is subject to curtailment or cessation of delivery by the supplier in accordance with a prior agreement with the other party or under specified conditions.

Interstate companies: Natural gas pipeline companies subject to Federal Energy Regulatory Commission (FERC) jurisdiction.

Interstate pipeline: Any person engaged in natural gas transportation subject to the jurisdiction of Federal Energy Regulatory Commission (FERC) under the Natural Gas Act.

Jet fuel: A refined petroleum product used in jet aircraft engines. It includes kerosene-type jet fuel and naphtha-type jet fuel.

Kerosene: A light petroleum distillate that is used in space heaters, cook stoves, and water heaters and is suitable for use as a light source when burned in wick-fed lamps. Kerosene has a maximum distillation temperature of 400 degrees Fahrenheit at the 10-percent recovery point, a final boiling point of 572 degrees Fahrenheit, and a minimum flash point of 100 degrees Fahrenheit. Included are No. 1-K and No. 2-K, the two grades recognized by ASTM Specification D 3699 as well as all other grades of kerosene called range or stove oil, which have properties similar to those of No. 1 fuel oil. Also see **Kerosene-type jet fuel**.

Kerosene-type jet fuel: A kerosene-based product having a maximum distillation temperature of 400 degrees Fahrenheit at the 10-percent recovery point and a final maximum boiling point of 572 degrees Fahrenheit and meeting ASTM Specification D 1655 and Military Specifications MIL-T-5624P and MIL-T-83133D (Grades JP-5 and JP-8). It is used for commercial and military turbojet and turboprop aircraft engines.

- **Commercial:** Kerosene-type jet fuel intended for use in commercial aircraft.
- **Military:** Kerosene-type jet fuel intended for use in military aircraft.

Ketone-alcohol (cyclohexanol): An oily, colorless, hygroscopic liquid with a camphor-like odor. Used in soapmaking, dry cleaning, plasticizers, insecticides, and germicides.

Kilovolt-Ampere (kVa): A unit of apparent power, equal to 1,000 volt-amperes; the mathematical product of the volts and amperes in an electrical circuit.

Kilowatt (kW): One thousand watts.

Kilowatt-electric (kWe): One thousand watts of electric capacity.

Kilowatthour (kWh): A measure of electricity defined as a unit of work or energy, measured as 1 kilowatt (1,000 watts) of power expended for 1 hour. One kWh is equivalent to 3,412 Btu.

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Leaded gasoline: A fuel that contains more than 0.05 gram of lead per gallon or more than 0.005 gram of phosphorus per gallon.

Leaded premium gasoline: Gasoline having an antiknock index (R+M/2) greater than 90 and containing more than 0.05 grams of lead or 0.005 grams of phosphorus per gallon.

Leaded regular gasoline: Gasoline having an antiknock index (R+M/2) greater than or equal to 87 and less than or equal to 90 and containing more than 0.05 grams of lead or 0.005 grams of phosphorus per gallon.

Load (electric): The amount of electric power delivered or required at any specific point or points on a system. The requirement originates at the energy-consuming equipment of the consumers.

Load control program: A program in which the utility company offers a lower rate in return for having permission to turn off the air conditioner or water heater for short periods of time by remote control. This control allows the utility to reduce peak demand.

Local distribution company (LDC): A legal entity engaged primarily in the retail sale and/or delivery of natural gas

through a distribution system that includes mainlines (that is, pipelines designed to carry large volumes of gas, usually located under roads or other major right-of-ways) and laterals (that is, pipelines of smaller diameter that connect the end user to the mainline). Since the restructuring of the gas industry, the sale of gas and/or delivery arrangements may be handled by other agents, such as producers, brokers, and marketers that are referred to as "non-LDC."

Loss of service (15 minutes): Any loss in service for greater than 15 minutes by an electric utility of firm loads totaling more than 200 MW, or 50 percent of the total load being supplied immediately prior to the incident, whichever is less. However, utilities with a peak load in the prior year of more than 3000 MW are only to report losses of service to firm loads totaling more than 300 MW for greater than 15 minutes. (The DOE shall be notified with service restoration and in any event, within three hours after the beginning of the interruption.)

Low Income Home Energy Assistance Program (LIHEAP): The purpose of LIHEAP is to assist eligible households to meet the cost of heating or cooling in residential dwellings. The Federal government provides the funds to the States that administer the program.

Main heating fuel: The form of energy used most frequently to heat the largest portion of the floorspace of a structure. The energy source designated as the main heating fuel is the source delivered to the site for that purpose, not any subsequent form into which it is transformed on site to deliver the heat energy (e.g., for buildings heated by a steam boiler, the main heating fuel is the main input fuel to the boiler, not the steam or hot water circulated through the building.) *Note:* In commercial buildings, the heating must be to at least 50 degrees Fahrenheit.

Mains: A system of pipes for transporting gas within a distributing gas utility's retail service area to points of connection with consumer service pipes.

Measured heated area of residence: The floor area of the housing unit that is enclosed from the weather and heated. Basements are included whether or not they contain finished space. Garages are included if they have a wall in common with the house. Attics that have finished space and attics that have some heated space are included. Crawl spaces are not included even if they are enclosed from the weather. Sheds and other buildings that are not attached to the house are not included. "Measured" area means the measurement of the dimensions of the home, using a metallic, retractable, 50-foot tape measure. "Heated area" is that portion of the measured area that is heated during most of the season. Rooms that are shut off during the heating season to save on fuel are not counted. Attached garages that are unheated and unheated areas in the attics and basements are also not counted.

Measured reserves: See [Proved energy reserves](#).

Measured resources, coal: Coal resources for which estimates of the rank, quality, and quantity have been computed, within a margin of error of less than 20 percent, from sample analyses and measurements from closely spaced and geologically well known sample sites. Measured resources are computed from dimensions revealed in outcrops, trenches, mine workings, and drill holes. The points of observation and measurement are so closely spaced and the thickness and extent of coals are so well defined that the tonnage is judged to be accurate within 20 percent. Although the spacing of the points of observation necessary to demonstrate continuity of the coal differs from region to region, according to the character of the coalbeds, the point of observation are no greater than 1/2 mile apart. Measured coal is projected to extend as a belt 1/4 mile wide from the outcrop or points of observation or measurement.

Megawatt (MW): One million watts of electricity.

Megawatt electric (MWe): One million watts of electric capacity.

Megawatthour (MWh): One thousand kilowatt-hours or 1 million watt-hours.

Naphtha: A generic term applied to a petroleum fraction with an approximate boiling range between 122 degrees Fahrenheit and 400 degrees Fahrenheit.

Naphtha less than 401 degrees Fahrenheit: See [Petrochemical feedstocks](#).

Naphthas: Refined or partly refined light distillates with an approximate boiling point range of 27 degrees to 221 degrees Centigrade. Blended further or mixed with other materials, they make high-grade motor gasoline or jet fuel. Also, used as solvents, petrochemical feedstocks, or as raw materials for the production of town gas.

Naphtha-type jet fuel: A fuel in the heavy naphtha boiling range having an average gravity of 52.8 degrees API, 20 to 90 percent distillation temperatures of 290 degrees to 470 degrees Fahrenheit, and meeting Military Specification MIL-T-5624L (Grade JP-4). It is used primarily for military turbojet and turboprop aircraft engines because it has a lower freeze point than other aviation fuels and meets engine requirements at high altitudes and speeds. *Note:* Beginning with January 2004 data, naphtha-type jet fuel is included in [Miscellaneous Products](#).

National Association of Regulatory Utility Commissioners (NARUC): An affiliation of the public service commissioners to promote the uniform treatment of members of the railroad, public utilities, and public service commissions of the 50 states, the District of Columbia, the Commonwealth of Puerto Rico, and the territory of the Virgin Islands.

National Rural Electric Cooperative Association (NRECA): A national organization dedicated to representing the interests of cooperative electric utilities and the consumers they serve. Members come from the 46 states that have an electric distribution cooperative.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Natural gas: A gaseous mixture of hydrocarbon compounds, the primary one being [methane](#). NOTE: The Energy Information Administration measures [wet natural gas](#) and its two sources of production, [associated/dissolved natural gas](#) and [nonassociated natural gas](#), and [dry natural gas](#), which is produced from [wet natural gas](#).

Natural gas, "dry": See [Dry natural gas](#).

Natural gas field facility: A field facility designed to process natural gas produced from more than one lease for the purpose of recovering condensate from a stream of natural gas; however, some field facilities are designed to recover propane, normal butane, pentanes plus, etc., and to control the quality of natural gas to be marketed.

Natural gas gross withdrawals: Full well-stream volume of produced natural gas, excluding condensate separated at the lease.

Natural gas hydrates: Solid, crystalline, wax-like substances composed of water, methane, and usually a small amount of other gases, with the gases being trapped in the interstices of a water-ice lattice. They form beneath permafrost and on the ocean floor under conditions of moderately high pressure and at temperatures near the freezing point of water.

Natural gas liquids (NGL): Those hydrocarbons in natural gas that are separated from the gas as liquids through the process of absorption, condensation, adsorption, or other methods in gas processing or cycling plants. Generally such liquids consist of propane and heavier hydrocarbons and are commonly referred to as lease condensate, natural gasoline, and liquefied petroleum gases. Natural gas liquids include natural gas plant liquids (primarily ethane, propane, butane, and isobutane; see **Natural Gas Plant Liquids**) and lease condensate (primarily pentanes produced from natural gas at lease separators and field facilities; see [Lease Condensate](#)).

Natural gas liquids production: The volume of natural gas liquids removed from natural gas in lease separators, field facilities, gas processing plants, or cycling plants during the report year.

Natural gas marketed production: Gross withdrawals of natural gas from production reservoirs, less gas used for reservoir repressuring, nonhydrocarbon gases removed in treating and processing operations, and quantities vented and flared.

Natural gas plant liquids: Those hydrocarbons in natural gas that are separated as liquids at natural gas processing plants, fractionating and cycling plants, and, in some instances, field facilities. Lease condensate is excluded. Products obtained include ethane; liquefied petroleum gases (propane, butanes, propane-butane mixtures, ethane-propane mixtures); isopentane; and other small quantities of finished products, such as motor gasoline, special naphthas, jet fuel, kerosene, and distillate fuel oil.

Natural Gas Policy Act of 1978 (NGPA): Signed into law on November 9, 1978, the NGPA is a framework for the regulation of most facets of the natural gas industry.

Natural gas processing plant: Facilities designed to recover natural gas liquids from a stream of natural gas that may or may not have passed through lease separators and/or field separation facilities. These facilities control the quality of the natural gas to be marketed. Cycling plants are classified as gas processing plants.

Natural gas production: See [Dry natural gas production](#).

Natural gas utility demand-side management (DSM) program sponsor: A DSM (demand-side management) program sponsored by a natural gas utility that suggests ways to increase the energy efficiency of buildings, to reduce energy costs, to change the usage patterns, or to promote the use of a different energy source.

Natural gasoline: A term used in the gas processing industry to refer to a mixture of liquid hydrocarbons (mostly pentanes and heavier hydrocarbons) extracted from natural gas. It includes isopentane.

Natural Gasoline and Isopentane: A mixture of hydrocarbons, mostly pentanes and heavier, extracted from natural gas, that meets vapor pressure, end-point, and other specifications for natural gasoline set by the Gas Processors Association. Includes isopentane which is a saturated branch-chain hydrocarbon, (C₅H₁₂), obtained by fractionation of natural gasoline or isomerization of normal pentane.

Net generation: The amount of gross generation less the electrical energy consumed at the generating station(s) for station service or auxiliaries. *Note:* Electricity required for pumping at pumped-storage plants is regarded as electricity for station service and is deducted from gross generation.

No. 1 diesel fuel: A light distillate fuel oil that has a distillation temperature of 550 degrees Fahrenheit at the 90-percent recovery point and meets the specifications defined in ASTM Specification D 975. It is used in high speed diesel engines generally operated under frequent speed and load changes, such as those in city buses and similar vehicles. See **No. 1 distillate** below.

No. 1 distillate: A light petroleum distillate that can be used as either a diesel fuel (see **No. 1 diesel fuel** above) or a fuel oil (see **No. 1 fuel oil** (below)).

No. 1 fuel oil: A light distillate fuel oil that has distillation temperatures of 400 degrees Fahrenheit at the 10-percent recovery point and 550 degrees Fahrenheit at the 90-percent recovery point and meets the specifications defined in ASTM Specification D 396. It is used primarily as fuel for portable outdoor stoves and portable outdoor heaters. See **No. 1 Distillate** above.

No. 2 diesel fuel: A distillate fuel oil that has a distillation temperature of 640 degrees Fahrenheit at the 90-percent

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

recovery point and meets the specifications defined in ASTM Specification D 975. It is used in high-speed diesel engines that are generally operated under uniform speed and load conditions, such as those in railroad locomotives, trucks, and automobiles. See **No. 2 Distillate** below.

No. 2 distillate: A petroleum distillate that can be used as either a diesel fuel (see **No. 2 diesel fuel** above) or a fuel oil (see **No. 2 fuel oil** below).

No. 2 fuel oil (heating oil): A distillate fuel oil that has a distillation temperature of 640 degrees Fahrenheit at the 90-percent recovery point and meets the specifications defined in ASTM Specification D 396. It is used in atomizing type burners for domestic heating or for moderate capacity commercial/industrial burner units. See **No. 2 Distillate** above.

No. 2 fuel oil and No. 2 diesel sold to consumers for all other end uses: Those consumers who purchase fuel oil or diesel fuel for their own use including: commercial/institutional buildings (including apartment buildings), manufacturing and nonmanufacturing establishments, farms (including farm houses), motor vehicles, commercial or private boats, military, governments, electric utilities, railroads, construction, logging or any other nonresidential end-use purpose.

No. 2 fuel oil sold to private homes for heating: Private household customers who purchase fuel oil for the specific purpose of heating their home, water heating, cooking, etc., excluding farm houses, farming and apartment buildings.

No. 4 fuel oil: A distillate fuel oil made by blending distillate fuel oil and residual fuel oil stocks. It conforms with ASTM Specification D 396 or Federal Specification VV-F-815C and is used extensively in industrial plants and in commercial burner installations that are not equipped with preheating facilities. It also includes No. 4 diesel fuel used for low- and medium-speed diesel engines and conforms to ASTM Specification D 975.

No. 5 and no. 6 fuel oil sold directly to the ultimate consumer: Includes ships, mines, smelters, manufacturing plants, electric utilities, drilling, railroad.

No. 5 and no. 6 fuel oil sold to refiners or other dealers who will resale the product: Includes all volumes of No. 5 and No. 6 fuel oil purchased by a trade or business with the intent of reselling the product to the ultimate consumers.

Nonattainment area: Any area that does not meet the national primary or secondary ambient air quality standard established by the Environmental Protection Agency for designated pollutants, such as carbon monoxide and ozone.

North American Electric Reliability Council (NERC): A council formed in 1968 by the electric utility industry to promote the reliability and adequacy of bulk power supply in the electric utility systems of North America. NERC consists of regional reliability councils and encompasses essentially all the power regions of the contiguous United States, Canada, and Mexico. See the various NERC Regional Reliability Councils here: <http://www.nerc.com/regional/>

North American Industry Classification System (NAICS): A new classification scheme, developed by the Office of Management and Budget to replace the Standard Industrial Classification (SIC) System, that categorizes establishments according to the types of production processes they primarily use.

Nuclear electric power (nuclear power): Electricity generated by the use of the thermal energy released from the fission of nuclear fuel in a reactor.

Nuclear fuel: Fissionable materials that have been enriched to such a composition that, when placed in a nuclear reactor, will support a self-sustaining fission chain reaction, producing heat in a controlled manner for process use.

Nuclear reactor: An apparatus in which a nuclear fission chain reaction can be initiated, controlled, and sustained at a specific rate. A reactor includes fuel (fissionable material), moderating material to control the rate of fission, a heavy-walled pressure vessel to house reactor components, shielding to protect personnel, a system to conduct heat away from the reactor, and instrumentation for monitoring and controlling the reactor's systems.

Number of mines: The number of mines, or mines collocated with preparation plants or tipples, located in a particular geographic area (State or region). If a mine is mining coal across two counties within a State, or across two States, then it is counted as two operations. This is done so that EIA can separate production by State and county.

Octane: A flammable liquid hydrocarbon found in petroleum. Used as a standard to measure the anti-knock properties of motor fuel.

Octane rating: A number used to indicate gasoline's antiknock performance in motor vehicle engines. The two recognized laboratory engine test methods for determining the antiknock rating, i.e., octane rating, of gasolines are the Research method and the Motor method. To provide a single number as guidance to the consumer, the antiknock index $(R + M)/2$, which is the average of the Research and Motor octane numbers, was developed.

OEM: Original Equipment Manufacturer.

Off-highway use: Includes petroleum products sales for use in:

1. **Construction.** Construction equipment including earthmoving equipment, cranes, stationary generators, air compressors, etc.
2. **Other.** Sales for off-highway uses other than construction. Sales for logging are included in this category. Volumes for off-highway use by the agriculture industry are reported under "Farm Use" (which includes sales for use in tractors, irrigation pumps, other agricultural machinery, etc.)

Oil company use: Includes sales to drilling companies, pipelines or other related oil companies not engaged in the selling of petroleum products. Includes fuel oil that was purchased or produced and used by company facilities for the operation

of drilling equipment, other field or refinery operations, and space heating at petroleum refineries, pipeline companies, and oil-drilling companies. Oil used to bunker vessels is counted under vessel bunkering. Sales to other oil companies for field use are included, but sales for use as refinery charging stocks are excluded

OPEC (Organization of the Petroleum Exporting Countries): An organization founded in Baghdad, Iraq, in September 1960, to unify and coordinate members' petroleum policies. OPEC members' national oil ministers meet regularly to discuss prices and, since 1982, to set crude oil production quotas. Original OPEC members include Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela. Between 1960 and 1975, the organization expanded to include Qatar (1961), Indonesia (1962), Libya (1962), the United Arab Emirates (1967), Algeria (1969), Nigeria (1971), Ecuador (1973), and Gabon (1975). Ecuador withdrew in December 1992, and Gabon withdrew in January 1995. Although Iraq remains a member of OPEC, Iraqi production has not been a part of any OPEC quota agreements since March 1998. For more information, go to OPEC's website at <http://www.opec.org/aboutus/history/history.htm>.

Operable capacity: The amount of capacity that, at the beginning of the period, is in operation; not in operation and not under active repair, but capable of being placed in operation within 30 days; or not in operation but under active repair that can be completed within 90 days. Operable capacity is the sum of the operating and idle capacity and is measured in barrels per calendar day or barrels per stream day.

Operable generators/units: Electric generators or generating units that are available to provide power to the grid or generating units that have been providing power to the grid but are temporarily shut down. This includes units in standby status, units out of service for an indefinite period, and new units that have their construction complete and are ready to provide test generation. A nuclear unit is operable once it receives its Full Power Operating License.

Operable nuclear unit (U.S.): A U.S. nuclear generating unit that has completed low-power testing and is in possession of a full-power operating license issued by the Nuclear Regulatory Commission.

Operating capacity: The component of operable capacity that is in operation at the beginning of the period.

Operating day: A normal business day. Days when a company conducts business due to emergencies or other unexpected events are not included.

Operator, gas plant: The person responsible for the management and day-to-day operation of one or more natural gas processing plants as of December 31 of the report year. The operator is generally a working-interest owner or a company under contract to the working-interest owner(s). Plants shut down during the report year are also to be considered "operated" as of December 31.

Operator, oil and/or gas well: The person responsible for the management and day-to-day operation of one or more crude oil and/or natural gas wells as of December 31 of the report year. The operator is generally a working-interest owner or a company under contract to the working-interest owner(s). Wells included are those that have proved reserves of crude oil, natural gas, and/or lease condensate in the reservoirs associated with them, whether or not they are producing. Wells abandoned during the report year are also to be considered "operated" as of December 31.

Organization for Economic Cooperation and Development (OECD): An international organization helping governments tackle the economic, social and governance challenges of a globalized economy. Its membership comprises about 30 member countries. With active relationships with some 70 other countries, NGOs and civil society, it has a global reach. For details about the organization, visit <http://www.oecd.org>.

Organization of the Petroleum Exporting Countries (OPEC): Countries that have organized for the purpose of negotiating with oil companies on matters of oil production, prices, and future concession rights. Current members (as of the date of writing this definition) are Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela. See OPEC's site at <http://www.opec.org> for more information.

Oxygenated gasoline: Finished motor gasoline, other than reformulated gasoline, having an oxygen content of 2.7 percent or higher by weight and required by the U.S. Environmental Protection Agency (EPA) to be sold in areas designated by EPA as carbon monoxide (CO) nonattainment areas. See [Nonattainment area](#). *Note:* Oxygenated gasoline excludes oxygenated fuels program reformulated gasoline (OPRG) and reformulated gasoline blendstock for oxygenate blending (RBOB). Data on gasohol that has at least 2.7 percent oxygen, by weight, and is intended for sale inside CO nonattainment areas are included in data on oxygenated gasoline. Other data on gasohol are included in data on conventional gasoline.

Oxygenated gasoline (includes Gasohol): Finished motor gasoline, other than reformulated gasoline, having an oxygen content of 2.7 percent or higher by weight. Includes gasohol. *Note:* Oxygenated gasoline excludes oxygenated fuels program reformulated gasoline (OPRG) and reformulated gasoline blendstock for oxygenate blending (RBOB).

Oxygenates: Substances which, when added to gasoline, increase the amount of oxygen in that gasoline blend. Ethanol, Methyl Tertiary Butyl Ether (MTBE), Ethyl Tertiary Butyl Ether (ETBE), and methanol are common oxygenates.

Ozone: A molecule made up of three atoms of oxygen. Occurs naturally in the stratosphere and provides a protective layer shielding the Earth from harmful ultraviolet radiation. In the troposphere, it is a chemical oxidant, a greenhouse gas, and a major component of photochemical smog.

Packaged air conditioning units: Usually mounted on the roof or on a slab beside the building. (These are known as self-contained units, or Direct Expansion (DX). They contain air conditioning equipment as well as fans, and may or may

not include heating equipment.) These are self-contained units that contain the equipment that generates cool air and the equipment that distributes the cooled air. These units commonly consume natural gas or electricity. The units are mounted on the rooftop, exposed to the elements. They typically blow cool air into the building through duct work, but other types of distribution systems may exist. The units usually serve more than one room. There are often several units on the roof of a single building. Also known as: Packaged Terminal Air Conditioners (PTAC). These packaged units are often constructed as a single unit for heating and for cooling.

Packaged units: Units built and assembled at a factory and installed as a self-contained unit to heat or cool all or portions of a building. Packaged units are in contrast to engineer-specified units built up from individual components for use in a given building. Packaged Units can apply to heating equipment, cooling equipment, or combined heating and cooling equipment. Some types of electric packaged units are also called "Direct Expansion" or DX units.

Payment method for utilities: The method by which fuel suppliers or utility companies are paid for all electricity, natural gas, fuel oil, kerosene, or liquefied petroleum gas used by a household. Households that pay the utility company directly are classified as "all paid by household." Households that pay directly for at least one but not all of their fuels used and that has at least one fuel charge included in the rent were classified as "some paid, some included in rent." Households for which all fuels used are included in rent were classified as "all included in rent." If the household did not fall into one of these categories, it was classified as "other." Examples of households falling into the "other" category are: (1) households for which fuel bills were paid by a social service agency or a relative, and (2) households that paid for some of their fuels used but paid for other fuels through another arrangement.

Peak day withdrawal: The maximum daily withdrawal rate (Mcf/d) experienced during the reporting period.

Peak demand: The maximum load during a specified period of time.

Peak kilowatt: One thousand peak watts.

Peak load: The maximum load during a specified period of time.

Peak load month: The month of greatest plant electrical generation during the winter heating season (Oct-Mar) and summer cooling season (Apr-Sept), respectively.

Peak load plant: A plant usually housing old, low-efficiency steam units, gas turbines, diesels, or pumped-storage hydroelectric equipment normally used during the peak-load periods.

Peak megawatt: One million peak watts.

Peak watt: A manufacturer's unit indicating the amount of power a photovoltaic cell or module will produce at standard test conditions (normally 1,000 watts per square meter and 25 degrees Celsius).

Peaking capacity: Capacity of generating equipment normally reserved for operation during the hours of highest daily, weekly, or seasonal loads. Some generating equipment may be operated at certain times as peaking capacity and at other times to serve loads on an around-the-clock basis.

Petroleum: A broadly defined class of liquid hydrocarbon mixtures. Included are crude oil, lease condensate, unfinished oils, refined products obtained from the processing of crude oil, and natural gas plant liquids. *Note:* Volumes of finished petroleum products include nonhydrocarbon compounds, such as additives and detergents, after they have been blended into the products.

Petroleum Administration for Defense District (PADD): A geographic aggregation of the 50 States and the District of Columbia into five Districts, with PADD I further split into three subdistricts. The PADDs include the States listed below: PADD I (East Coast):

- PADD IA (New England): Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
 - PADD IB (Central Atlantic): Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania.
 - PADD IC (Lower Atlantic): Florida, Georgia, North Carolina, South Carolina, Virginia, and West Virginia.
- PADD II (Midwest): Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, and Wisconsin.
- PADD III (Gulf Coast): Alabama, Arkansas, Louisiana, Mississippi, New Mexico, and Texas.
- PADD IV (Rocky Mountain): Colorado, Idaho, Montana, Utah, and Wyoming.
- PADD V (West Coast): Alaska, Arizona, California, Hawaii, Nevada, Oregon, and Washington.

Petroleum imports: Imports of petroleum into the 50 states and the District of Columbia from foreign countries and from Puerto Rico, the Virgin Islands, and other U.S. territories and possessions. Included are imports for the Strategic Petroleum Reserve and withdrawals from bonded warehouses for onshore consumption, offshore bunker use, and military use. Excluded are receipts of foreign petroleum into bonded warehouses and into U.S. territories and U.S. Foreign Trade Zones.

Petroleum jelly: A semi-solid oily product produced from de-waxing lubricating oil basestocks.

Petroleum products: Petroleum products are obtained from the processing of crude oil (including lease condensate), natural gas, and other hydrocarbon compounds. Petroleum products include unfinished oils, liquefied petroleum gases,

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

pentanes plus, aviation gasoline, motor gasoline, naphtha-type jet fuel, kerosene-type jet fuel, kerosene, distillate fuel oil, residual fuel oil, petrochemical feedstocks, special naphthas, lubricants, waxes, petroleum coke, asphalt, road oil, still gas, and miscellaneous products.

Petroleum refinery: An installation that manufactures finished petroleum products from crude oil, unfinished oils, natural gas liquids, other hydrocarbons, and alcohol.

Petroleum stocks, primary: For individual products, quantities that are held at refineries, in pipelines and at bulk terminals that have a capacity of 50,000 barrels or more, or that are in transit thereto. Stocks held by product retailers and resellers, as well as tertiary stocks held at the point of consumption, are excluded. Stocks of individual products held at gas processing plants are excluded from individual product estimates but are included in other oils estimates and total.

Pipeline, distribution: A pipeline that conveys gas from a transmission pipeline to its ultimate consumer.

Pipeline freight: Refers to freight carried through pipelines, including natural gas, crude oil, and petroleum products (excluding water). Energy is consumed by various electrical components of the pipeline, including, valves, other, appurtenances attaches to the pipe, compressor units, metering stations, regulator stations, delivery stations, holders and fabricated assemblies.

Pipeline fuel: Gas consumed in the operation of pipelines, primarily in compressors.

Pipeline, gathering: A pipeline that conveys gas from a production well/field to a gas processing plant or transmission pipeline for eventual delivery to end-use consumers.

Pipeline (natural gas): A continuous pipe conduit, complete with such equipment as valves, compressor stations, communications systems, and meters for transporting natural and/or supplemental gas from one point to another, usually from a point in or beyond the producing field or processing plant to another pipeline or to points of utilization. Also refers to a company operating such facilities.

Pipeline (petroleum): Crude oil and product pipelines used to transport crude oil and petroleum products, respectively (including interstate, intrastate, and intracompany pipelines), within the 50 states and the District of Columbia.

Pipeline purchases: Gas supply contracted from and volumes purchased from other natural gas companies as defined by the Natural Gas Act, as amended (52 Stat. 821), excluding independent producers, as defined in Paragraph 154.91(a), Chapter I, Title 18 of the Code of Federal Regulations.

Pipeline quality natural gas: A mixture of hydrocarbon compounds existing in the gaseous phase with sufficient energy content, generally above 900 British thermal units, and a small enough share of impurities for transport through commercial gas pipelines and sale to end-users.

Pipeline, transmission: A pipeline that conveys gas from a region where it is produced to a region where it is to be distributed.

Pipelines, rate regulated: FRS (Financial Reporting System Survey) establishes three pipeline segments: crude/liquid (raw materials); natural gas; and refined products. The pipelines included in these segments are all federally or State rate-regulated pipeline operations, which are included in the reporting company's consolidated financial statements. However, at the reporting company's option, intrastate pipeline operations may be included in the U.S. Refining/Marketing Segment if: they would comprise less than 5 percent of U.S. Refining/Marketing Segment net PP&E, revenues, and earnings in the aggregate; and if the inclusion of such pipelines in the consolidated financial statements adds less than \$100 million to the net PP&E reported for the U.S. Refining/Marketing Segment.

Population-weighted degree-days: Heating or cooling degree-days weighted by the population of the area in which the degree-days are recorded. To compute national population-weighted degree-days, the Nation is divided into nine Census regions comprised of from three to eight states that are assigned weights based on the ratio of the population of the region to the total population of the Nation. Degree-day readings for each region are multiplied by the corresponding population weight for each region, and these products are then summed to arrive at the national population weighted degree-day figure.

Potential peak reduction: The potential annual peak load reduction (measured in kilowatts) that can be deployed from Direct Load Control, Interruptible Load, Other Load Management, and Other DSM Program activities. (Please note that Energy Efficiency and Load Building are not included in Potential Peak Reduction.) It represents the load that can be reduced either by the direct control of the utility system operator or by the consumer in response to a utility request to curtail load. It reflects the installed load reduction capability, as opposed to the Actual Peak Reduction achieved by participants, during the time of annual system peak load.

Power (electrical): An electric measurement unit of power called a voltampere is equal to the product of 1 volt and 1 ampere. This is equivalent to 1 watt for a direct current system, and a unit of apparent power is separated into real and reactive power. Real power is the work-producing part of apparent power that measures the rate of supply of energy and is denoted as kilowatts (kW). Reactive power is the portion of apparent power that does no work and is referred to as kilovars; this type of power must be supplied to most types of magnetic equipment, such as motors, and is supplied by generator or by electrostatic equipment. Voltamperes are usually divided by 1,000 and called kilovoltamperes (kVA). Energy is denoted by the product of real power and the length of time utilized; this product is expressed as kilowathours.

Power production plant: All the land and land rights, structures and improvements, boiler or reactor vessel equipment,

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

engines and engine-driven generator, turbogenerator units, accessory electric equipment, and miscellaneous power plant equipment are grouped together for each individual facility.

Power transfer limit: The maximum power that can be transferred from one electric utility system to another without overloading any facility in either system.

Powerhouse: A structure at a hydroelectric plant site that contains the turbine and generator.

PP&E, additions to: The current year's expenditures on property, plant, and equipment (PP&E). The amount is predicated upon each reporting company's accounting practice. That is, accounting practices with regard to capitalization of certain items may differ across companies, and therefore this figure in FRS (Financial Reporting System) will be a function of each reporting company's policy.

Premium gasoline: Gasoline having an antiknock index (R+M/2) greater than 90. Includes both leaded premium gasoline as well as unleaded premium gasoline

Primary coal: All coal milled and, when necessary, washed and sorted.

Primary energy: All energy consumed by end users, excluding electricity but including the energy consumed at electric utilities to generate electricity. (In estimating energy expenditures, there are no fuel-associated expenditures for hydroelectric power, geothermal energy, solar energy, or wind energy, and the quantifiable expenditures for process fuel and intermediate products are excluded.)

Primary energy consumption: Primary energy consumption is the amount of site consumption, plus losses that occur in the generation, transmission, and distribution of energy.

Primary energy consumption expenditures: Expenditures for energy consumed in each of the four major end-use sectors, excluding energy in the form of electricity, plus expenditures by the electric utilities sector for energy used to generate electricity. There are no fuel-associated expenditures for associated expenditures for hydroelectric power, geothermal energy, photovoltaic and solar energy, or wind energy. Also excluded are the quantifiable consumption expenditures that are an integral part of process fuel consumption.

Primary fuels: Fuels that can be used continuously. They can sustain the boiler sufficiently for the production of electricity.

Primary metropolitan statistical area (PMSA): A component area of a [Consolidated metropolitan statistical area](#) consisting of a large urbanized county or cluster of counties (cities and towns in New England) that demonstrate strong internal economic and social links in addition to close ties with the central core of the larger area. To qualify, an area must meet specified statistical criteria that demonstrate these links and have the support of local opinion.

Probable (indicated) reserves, coal: Reserves or resources for which tonnage and grade are computed partly from specific measurements, samples, or production data and partly from projection for a reasonable distance on the basis of geological evidence. The sites available are too widely or otherwise inappropriately spaced to permit the mineral bodies to be outlined completely or the grade established throughout.

Production, natural gas: The volume of natural gas withdrawn from reservoirs less (1) the volume returned to such reservoirs in cycling, repressuring of oil reservoirs, and conservation operations; less (2) shrinkage resulting from the removal of lease condensate; and less (3) nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable. Volumes of gas withdrawn from gas storage reservoirs and native gas, which has been transferred to the storage category, are not considered production. Flared and vented gas is also considered production. (This differs from "Marketed Production" which excludes flared and vented gas.)

Production, natural gas, dry: The volume of natural gas withdrawn from reservoirs during the report year less (1) the volume returned to such reservoirs in cycling, repressuring of oil reservoirs, and conservation operations; less (2) shrinkage resulting from the removal of lease condensate and plant liquids; and less (3) nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable. Volumes of gas withdrawn from gas storage reservoirs and native gas, which has been transferred to the storage category, are not considered production. This is not the same as marketed production, because the latter also excludes vented and flared gas, but contains plant liquids.

Production, natural gas liquids: Production of natural gas liquids is classified as follows:

---**Contract Production.** Natural gas liquids accruing to a company because of its ownership of liquids extraction facilities that it uses to extract liquids from gas belonging to others, thereby earning a portion of the resultant liquids.

---**Leasehold Production.** Natural gas liquids produced, extracted, and credited to a company's interest.

---**Contract Reserves.** Natural gas liquid reserves corresponding to the contract production defined above.

---**Leasehold Reserves.** Natural gas liquid reserves corresponding to leasehold production defined above.

Production, natural gas, wet after lease separation: The volume of natural gas withdrawn from reservoirs less (1) the volume returned to such reservoirs in cycling, repressuring of oil reservoirs, and conservation operations; less (2) shrinkage resulting from the removal of lease condensate; and less (3) nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable. *Note:* Volumes of gas withdrawn from gas storage reservoirs and native gas that has been transferred to the storage category are not considered part of production. This production concept is not the same as marketed production, which excludes vented and flared gas.

Production, oil and gas: The lifting of oil and gas to the surface and gathering, treating, field processing (as in the case

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

of processing gas to extract liquid hydrocarbons), and field storage. The production function shall normally be regarded as terminating at the outlet valve on the lease or field production storage tank. If unusual physical or operational circumstances exist, it may be more appropriate to regard the production function as terminating at the first point at which oil, gas, or gas liquids are delivered to a main pipeline, a common carrier, a refinery, or a marine terminal.

Propane (C₃H₈): A normally gaseous straight-chain hydrocarbon. It is a colorless paraffinic gas that boils at a temperature of -43.67 degrees Fahrenheit. It is extracted from natural gas or refinery gas streams. It includes all products designated in ASTM Specification D1835 and Gas Processors Association Specifications for commercial propane and HD-5 propane.

Propane air: A mixture of propane and air resulting in a gaseous fuel suitable for pipeline distribution.

Propane, consumer grade: A normally gaseous paraffinic compound (C₃H₈), which includes all products covered by Natural Gas Policy Act Specifications for commercial and HD-5 propane and ASTM Specification D 1835. Excludes: feedstock propanes, which are propanes not classified as consumer grade propanes, including the propane portion of any natural gas liquid mixes, i.e., butane-propane mix.

Public utility: Enterprise providing essential public services, such as electric, gas, telephone, water, and sewer under legally established monopoly conditions.

Public utility district: Municipal corporations organized to provide electric service to both incorporated cities and towns and unincorporated rural areas.

Public Utility Holding Company Act of 1935 (PUHCA): This act prohibits acquisition of any wholesale or retail electric business through a holding company unless that business forms part of an integrated public utility system when combined with the utility's other electric business. The legislation also restricts ownership of an electric business by non-utility corporations.

Public Utility Regulatory Policies Act (PURPA) of 1978: One part of the National Energy Act, PURPA contains measures designed to encourage the conservation of energy, more efficient use of resources, and equitable rates. Principal among these were suggested retail rate reforms and new incentives for production of electricity by cogenerators and users of renewable resources. The Commission has primary authority for implementing several key PURPA programs.

Publicly owned electric utility: A class of ownership found in the electric power industry. This group includes those utilities operated by municipalities and State and Federal power agencies.

PVCs that convert sunlight directly into energy: A method for producing energy by converting sunlight using photovoltaic cells (PVCs) that are solid-state single converter devices. Although currently not in wide usage, commercial customers have a growing interest in usage and, therefore, DOE has a growing interest in the impact of PVCs on energy consumption. Economically, PVCs are competitive with other sources of electricity.

Quality or grade (of coal): An informal classification of coal relating to its suitability for use for a particular purpose. Refers to individual measurements such as heat value, fixed carbon, moisture, ash, sulfur, major, minor, and trace elements, coking properties, petrologic properties, and particular organic constituents. The individual quality elements may be aggregated in various ways to classify coal for such special purposes as metallurgical, gas, petrochemical, and blending usages.

R-value: A measure of a material's resistance to heat flow in units of Fahrenheit degrees x hours x square feet per Btu. The higher the R-value of a material, the greater its insulating capability. The R-value of some insulating materials is 3.7 per inch for fiberglass and cellulose, 2.5 per inch for vermiculite, and more than 4 per inch for foam. All building materials have some R-value. For example, a 4-inch brick has an R-value of 0.8, and half-inch plywood has an R-value of 0.6. The below table converts the most common "R" values to inches. For other "R" values, divide the "R" value by 3 to get the number of inches.

<u>"R"-Value</u>	<u>Inches</u>
3	1
11	3.5
19	6
52	18

Rack sales: Wholesale truckload sales or smaller of gasoline where title transfers at a terminal.

Reformulated gasoline: Finished gasoline formulated for use in motor vehicles, the composition and properties of which meet the requirements of the reformulated gasoline regulations promulgated by the U.S. Environmental Protection Agency under Section 211(k) of the Clean Air Act. It includes gasoline produced to meet or exceed emissions performance and benzene content standards of federal-program reformulated gasoline even though the gasoline may not meet all of the composition requirements (e.g. oxygen content) of federal-program reformulated gasoline. *Note:* This category includes Oxygenated Fuels Program Reformulated Gasoline (OPRG). Reformulated gasoline excludes Reformulated Blendstock

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

for Oxygenate Blending (RBOB) and Gasoline Treated as Blendstock (GTAB).

Reseller: A firm (other than a refiner) that is engaged in a trade or business that buys refined petroleum products and then sells them to a purchaser who is not the ultimate consumer of those refined products.

Reserves, coal: Quantities of unextracted coal that comprise the demonstrated base for future production, including both proved and probable reserves. Also see [Proved energy reserves](#); **Probable energy reserves**; **Energy reserves**; **Proved (measured) reserves, coal**; and **Probable(indicated) reserves, coal**.

Reserves, energy: See [Proved energy reserves](#).

Reserves, net: Includes all proved reserves associated with the company's net working interests.

Reserves changes: Positive and negative revisions, extensions, new reservoir discoveries in old fields, and new field discoveries that occurred during the report year.

Residential propane price: The "bulk keep full" price for home delivery of consumer-grade propane intended for use in space heating, cooking, or hot water heaters in residences.

Residual fuel oil: A general classification for the heavier oils, known as No. 5 and No. 6 fuel oils, that remain after the distillate fuel oils and lighter hydrocarbons are distilled away in refinery operations. It conforms to ASTM Specifications D 396 and D 975 and Federal Specification VV-F-815C. No. 5, a residual fuel oil of medium viscosity, is also known as Navy Special and is defined in Military Specification MIL-F-859E, including Amendment 2 (NATO Symbol F-770). It is used in steam-powered vessels in government service and inshore powerplants. No. 6 fuel oil includes Bunker C fuel oil and is used for the production of electric power, space heating, vessel bunkering, and various industrial purposes.

Retail motor gasoline prices: Motor gasoline prices calculated each month by the Bureau of Labor Statistics (BLS) in conjunction with the construction of the Consumer Price Index.

Rural Electrification Administration (REA): A lending agency of the U. S. Department of Agriculture, the REA makes self-liquidating loans to qualified borrowers to finance electric and telephone service to rural areas. The REA finances the construction and operation of generating plants, electric transmission and distribution lines, or systems for the furnishing of initial and continued adequate electric services to persons in rural areas not receiving central station service.

Scheduled outage: The shutdown of a generating unit, transmission line, or other facility for inspection or maintenance, in accordance with an advance schedule.

Spot market (natural gas): A market in which natural gas is bought and sold for immediate or very near-term delivery, usually for a period of 30 days or less. The transaction does not imply a continuing arrangement between the buyer and the seller. A spot market is more likely to develop at a location with numerous pipeline interconnections, thus allowing for a large number of buyers and sellers. The Henry Hub in southern Louisiana is the best known spot market for natural gas.

SPR: See **Strategic Petroleum Reserve** (below).

Stand-alone generator: A power source/generator that operates independently of or is not connected to an electric transmission and distribution network; used to meet a load(s) physically close to the generator.

Standby electricity generation: Involves use of generators during times of high demand on utilities to avoid extra "peak-demand" charges.

Standby facility: A facility that supports a utility system and is generally running under no-load. It is available to replace or supplement a facility normally in service.

Station (electric): A plant containing prime movers, electric generators, and auxiliary equipment for converting mechanical, chemical, and/or nuclear energy into electric energy.

Station use: Energy that is used to operate an electric generating plant. It includes energy consumed for plant lighting, power, and auxiliary facilities, regardless of whether the energy is produced at the plant or comes from another source.

Strategic Petroleum Reserve (SPR): Petroleum stocks maintained by the Federal Government for use during periods of major supply interruption

Subbituminous coal: A coal whose properties range from those of lignite to those of bituminous coal and used primarily as fuel for steam-electric power generation. It may be dull, dark brown to black, soft and crumbly, at the lower end of the range, to bright, jet black, hard, and relatively strong, at the upper end. Subbituminous coal contains 20 to 30 percent inherent moisture by weight. The heat content of subbituminous coal ranges from 17 to 24 million Btu per ton on a moist, mineral-matter-free basis. The heat content of subbituminous coal consumed in the United States averages 17 to 18 million Btu per ton, on the as-received basis (i.e., containing both inherent moisture and mineral matter).

Tanker and barge: Vessels that transport crude oil or petroleum products. **Note:** Data are reported for movements between PAD Districts; from a PAD District to the Panama Canal; or from the Panama Canal to a PAD District.

Three-phase power: Power generated and transmitted from generator to load on three conductors.

Transformer: An electrical device for changing the voltage of alternating current.

Transmission and distribution loss: Electric energy lost due to the transmission and distribution of electricity. Much of the loss is thermal in nature.

Transmission (electric) (verb): The movement or transfer of electric energy over an interconnected group of lines and

associated equipment between points of supply and points at which it is transformed for delivery to consumers or is delivered to other electric systems. Transmission is considered to end when the energy is transformed for distribution to the consumer.

Transmission circuit: A conductor used to transport electricity from generating stations to load.

Transmission line: A set of conductors, insulators, supporting structures, and associated equipment used to move large quantities of power at high voltage, usually over long distances between a generating or receiving point and major substations or delivery points.

Transmission network: A system of transmission or distribution lines so cross-connected and operated as to permit multiple power supply to any principal point.

Transmission system (electric): An interconnected group of electric transmission lines and associated equipment for moving or transferring electric energy in bulk between points of supply and points at which it is transformed for delivery over the distribution system lines to consumers or is delivered to other electric systems.

Transmission type (engine): The transmission is the part of a vehicle that transmits motive force from the engine to the wheels, usually by means of gears for different speeds using either a hydraulic "torque-converter" (automatic) or clutch assembly (manual). On front-wheel drive cars, the transmission is often called a "transaxle." Fuel efficiency is usually higher with manual rather than automatic transmissions, although modern, computer-controlled automatic transmissions can be efficient.

Transmitting utility: A regulated entity which owns and may construct and maintain wires used to transmit wholesale power. It may or may not handle the power dispatch and coordination functions. It is regulated to provide non-discriminatory connections, comparable service, and cost recovery. According to the Energy Policy Act of 1992, it includes any electric utility, qualifying cogeneration facility, qualifying small power production facility, or Federal power marketing agency which owns or operates electric power transmission facilities which are used for the sale of electric energy at wholesale.

Underground storage: The storage of natural gas in underground reservoirs at a different location from which it was produced.

Vehicle fuel consumption: Vehicle fuel consumption is computed as the vehicle miles traveled divided by the fuel efficiency reported in miles per gallon (MPG). Vehicle fuel consumption is derived from the actual vehicle mileage collected and the assigned MPGs obtained from EPA certification files adjusted for on-road driving. The quantity of fuel used by vehicles.

Vehicle fuel efficiencies: See [Miles per gallon](#).

Vehicle fuel expenditures: The cost, including taxes, of the gasoline, gasohol, or diesel fuel added to the vehicle's tank. Expenditures do not include the cost of oil or other items that may have been purchased at the same time as the vehicle fuel.

Vehicle identification number (VIN): A set of codes, usually alphanumeric characters, assigned to a vehicle at the factory and inscribed on the vehicle. When decoded, the VIN provides vehicle characteristics. The VIN is used to help match vehicles to the EPA certification file for calculating MPGs.

Wet natural gas: A mixture of hydrocarbon compounds and small quantities of various nonhydrocarbons existing in the gaseous phase or in solution with crude oil in porous rock formations at reservoir conditions. The principal hydrocarbons normally contained in the mixture are methane, ethane, propane, butane, and pentane. Typical nonhydrocarbon gases that may be present in reservoir natural gas are water vapor, carbon dioxide, hydrogen sulfide, nitrogen and trace amounts of helium. Under reservoir conditions, natural gas and its associated liquefiable portions occur either in a single gaseous phase in the reservoir or in solution with crude oil and are not distinguishable at the time as separate substances. *Note:* The Securities and Exchange Commission and the Financial Accounting Standards Board refer to this product as **natural gas**.

APPENDIX B - STATE SET-ASIDE/FUEL ALLOCATION PROGRAM

1. INTRODUCTION

The state's set-aside program is designed to interfere minimally with the market, using set-aside volumes that are sufficient only to satisfy hardship and emergency cases. The set-aside program makes no attempt to reduce or inhibit the market price of fuels. All fuel delivered through the program will be purchased at the market price, and whenever possible, through the usual supplier.

1.1 PURPOSE

The purpose of the Petroleum Fuels Set-Aside Program Chapter B is to provide a working description of all aspects of the program, including staff operations and procedures for approvals, appeals, audits, and reports to the governor and legislature. The program augments the policy and program concepts contained in the Delaware Energy Assurance Plan (EAP).

This Chapter provides a description of the application process. The Chapter explains the eligibility for each program element, how to apply for each program element, instructions for completing the application forms, and procedures for appeal if the application is denied.

Percentage of Products Set-Aside

The monthly set-aside percentages applicable to prime suppliers and brokers for petroleum products subject to the set-aside program shall be as follows:

Gasoline.....	5 percent
Diesel.....	4 percent
Low Sulfur Diesel.....	4 Percent
High Sulfur Diesel (Red Dye).....	4 Percent
Kerosene.....	4 percent
#2 Fuel Oil (Heating Oil).....	4 percent
Aviation Gas.....	5 percent
Jet Fuel	5 percent
Propane.....	3 percent

Figure B.1

1.2 DESCRIPTION

There are four elements in the fuels set-aside program: basic set-aside; community hardship; assignment of prime supplier and adjustment of supply volume; and certification for emergency services. To achieve maximum flexibility in the set-aside program, the individual elements within the program are implemented only as directed by the Fuel Contingency manager (FCM) or the Emergency Support Function ESF-12 Advisory Group; they will not automatically become effective when the set-aside program is implemented. In addition, some parts of the program will be implemented only if the federal government institutes price and allocation controls.

1.2.1 BASIC SET-ASIDE ELEMENT

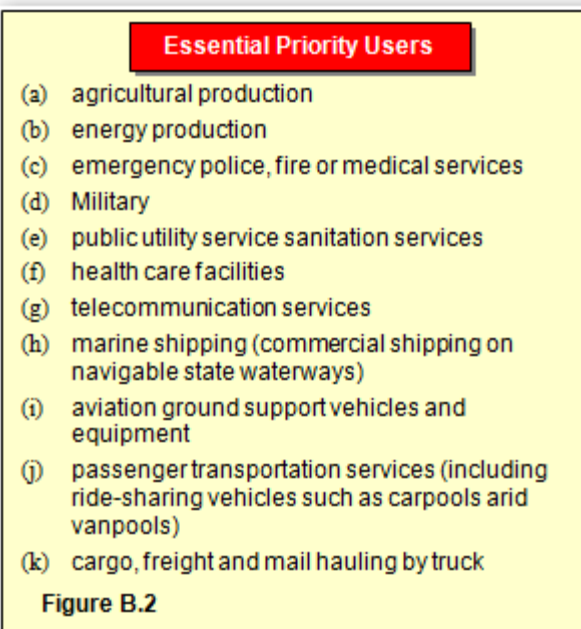
The Basic Set-Aside Element redistributes fuel supplies to bulk consumers who are considered priority users and who are experiencing difficulty obtaining sufficient fuel supplies at any price.

1.2.2 COMMUNITY HARDSHIP ELEMENT

The Community Hardship Element allows for distribution of fuels to qualified fuel-short areas. A community may request fuel supplies from the state set-aside when it is experiencing an emergency or hardship caused by a shortage of fuel, or is receiving less than 80 percent of the allocation fraction. A community is defined as either a city or county, or a geographic area of five square miles but containing ten service stations, or a military base exchange. Community hardship is the only element of the program whereby retail service stations may be eligible for a set-aside allocation.

1.2.3 ASSIGNMENT & ADJUSTMENT ELEMENT

The Assignment and Adjustment Element is primarily intended for use only after the federal government institutes a price and allocation control program. Those bulk purchasing end users who have not established a record of fuel deliveries for the base period may request that they be assigned a prime supplier. Those end users who have substantially increased their fuel use since the time of the base period may apply for an adjustment of supply volume to increase the amount of their supplies. The fuels allocation officer may extend assignments and adjustments on a month-to-month basis, or for a maximum of a 90-demand period. This assignment automatically expires at the end of the designated period, at which time the applicant may request an extension.



1.2.4 CERTIFICATION ELEMENT

The Certification Element of the program allows priority end users who provide emergency, health, safety, or essential services to apply for certification of need to receive their needed supplies. They must provide justification for a request that exceeds their base period volume. This element is designed to help ensure that emergency services are not interrupted or threatened due to inadequate fuel supplies. The certification, once approved, will remain valid as long as this element of the program is operational.

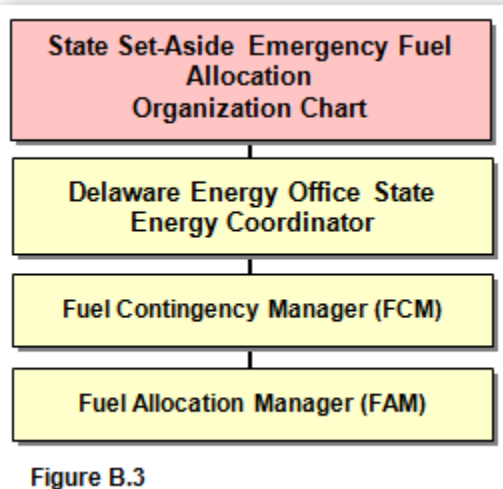
1.3 SET-ASIDE PRIORITY SYSTEM

When certain critical services and industries are unable to obtain adequate supplies of fuel

through the existing market, these bulk purchasers can apply to the State Energy Office (Delaware DEMA - Energy Response Team) for additional fuel through a priority distribution system. Each application will be reviewed and evaluated by the Delaware DEMA - Energy Response Team as to the justification for the request.

1.3.4 UNUSED SET-ASIDE VOLUME

Maximum flexibility in the release of the unused portion of the monthly set-aside volume is achieved by balancing public benefit with logistical and administrative efficiency. The fuel allocation officer may choose either to release to the supplier unused portions of the set-aside no later than the 20th of each month, or to hold any unused volume until the first of the following month. This unused set-aside volume shall not be counted in computing the subsequent month's set-aside volume, but must be distributed the following month. Whichever option the Fuel Allocation Officer selects, all suppliers are required to conform, thus ensuring uniformity in the release of supplies. If there continues to be unused volume in the set-aside each month, this is an indication that the percent used to calculate the volume is too high.



1.4 OPERATING GUIDELINES

The success of the Delaware State Energy Emergency Response Plan depends upon its management and the degree of preparedness of the individuals involved in its implementation. To the extent that the staff is trained, understands the plan, and carries out the duties of their positions, the plan will become operational at the critical time. Operating guidelines providing a checklist of specific duties and responsibilities follow for each position shown on the organization charts. The Operating Guidelines are in the contingency plan.

The Fuel Contingency Manager (FCM) will direct the State Set-Aside Emergency Fuel Allocation Program. The specific management of the program will be the responsibility of the Fuel Contingency Manager (FCM) and the Fuel Allocation Manager (FAM). The Operating Guidelines for the fuel contingency manager follow.

1.4.1 SET-ASIDE CONTINGENCY FILE

The set-aside contingency file contains the historical record of Delaware's past fuels set-aside operations plus the proposed operational instructions and procedures for future use of the program. The historical records document set-aside office activity, descriptions of programs, policies, and reports. These records are intended to serve as a reference to aid in any future activation of the program.

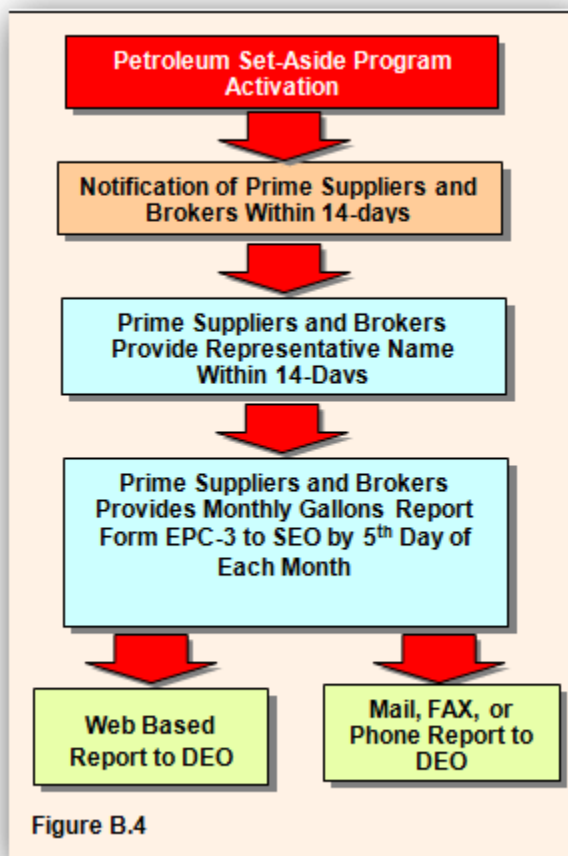
The contingency file contains operational instructions and procedures needed by Delaware DEMA - Energy Response Team staff to activate a fuels set-aside program. Although these instructions and procedures will be updated periodically to remain current, it is anticipated that in

order to appropriately respond to the circumstances, they may need to be modified at the time of a future energy shortage.

The FCM, together with the FAO, will use the contingency file, along with their perceptions of the seriousness of the shortage, to determine the appropriate staffing level, office and equipment needs, and funding requirements. The FAO will use the Contingency File to aid in determining involvement needed from other Delaware State Emergency Function Group 12 (ESF-12) staff and state agencies (e.g. Department of Motor Vehicles and Delaware Office of Emergency Management) who need to be notified early in the implementation of the set-aside program.

1.4.1.1 CONTINGENCY FILE CONTENTS

- Descriptions of office positions and duty statements audit and appeal process, application login, and tracking process.
- Procedures for selecting potential audit candidates and criteria for defining abuse.
- General office forms for coordinating office activity.
- Set-aside forms, including application forms, appeal forms, appeal review forms, and instructions for completion.
- Guidelines and procedures for requesting fuel through each individual element of the program and eligibility criteria for the approval of applications.
- Public information system procedures to inform the public that the set-aside program is in place and provide a description of the application and appeals process, plus a copy of the User's Guide.
- Computer programs, documentation and user instructions for the computer model that performs all fuel application demand processing. It contains a description of a simulated test of the computer program, and caveats of the program. It contains copies of notification letters printed by the computer for prime suppliers, distributors and applicants.



1.5 APPEAL PROCESS

If the FCM denies the application or grants less fuel than requested, the applicant may file a written appeal. The appeal must be filed within 15 demands after the decision. The applicant must fully explain the objection to the decision by the FCM, and why the particular situation constitutes a hardship or emergency.

An appeals unit is independent of the State Energy Office. This unit will review applications for all program elements whose applicants are protesting the decisions of the FCM.

The appeals unit must act on the appeal within 15 demands after the appeal has been received by the PUC. The appeals unit will first send a letter to the appellant acknowledging the receipt of the appeal. Next the appeals unit will notify and meet with the FCM to reconsider the application. Following the reconsideration process, the appeals unit will take one of three possible steps:

- Reverse the prior decision and grant the requested fuel;
- Reverse the prior decision and grant an increase in the amount of fuel originally allocated; or
- Affirm the prior decision and deny the application with cause.

The FCM will send the applicant a notification of decision within 15 demands, indicating whether or not the appeal has been approved. If approved, the applicant will be issued a request order, authorizing the assignment of fuel. A duplicate copy of the request order will also be sent to the supplier that is designated the prime supplier. The applicant must make arrangements with the supplier for delivery of fuel.

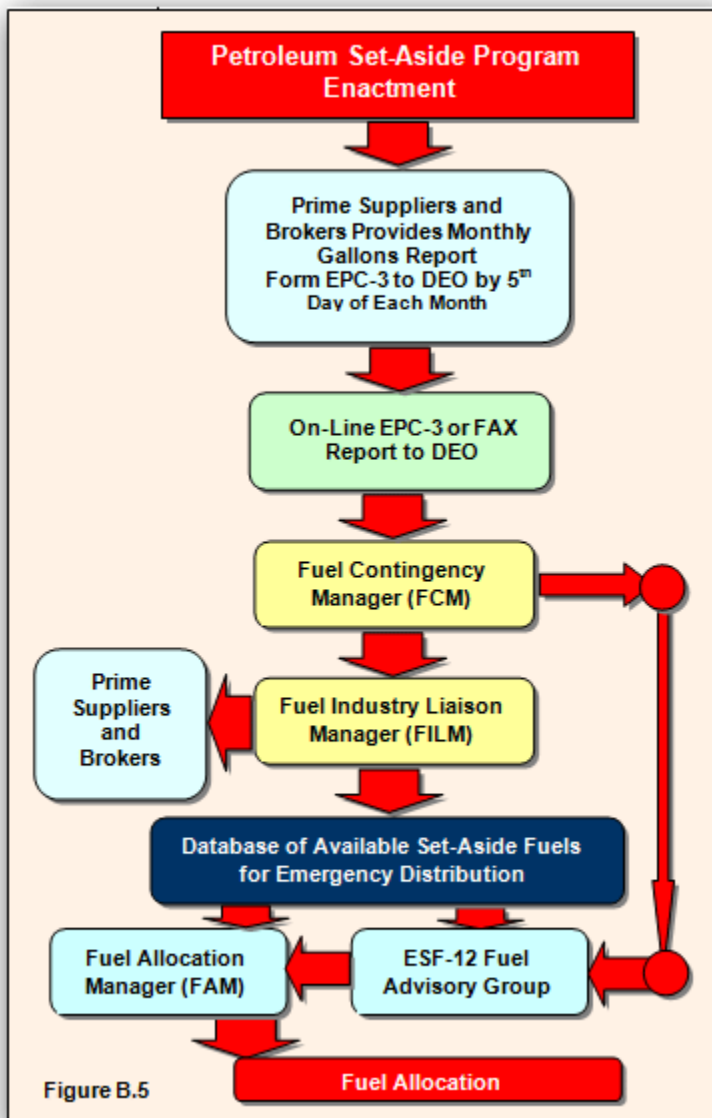


Figure B.5

1.6 AUDIT PROGRAM

The set-aside program shall contain provisions for the auditing of approved applications to discourage and prosecute those who would abuse the set-aside program. The audit is intended to prevent misrepresentation of facts, or use of the fuel for a purpose other than as stated, or resale of the fuel. It is the task of the fuel contingency manager to identify suspected fraud. It is the task of the fuel contingency manager to conduct the audit. The FCM will use three criteria for selecting applications to audit: (1) suspicion of abuse; (2) public complaint; and (3) random selection.

Suspicion of Abuse. Applications that are approved will be entered into a computer program having the capability to screen for discrepancies and possible abuse. The following four situations may suggest possible abuse:

- ***Duplicate Application.*** A single applicant has filed more than one application for the same fuel type in the same month.
- ***Large Increase in Requested Volume.*** An applicant is requesting a much larger volume of fuel than in the previous month.
- ***Change in Fuel Delivery Address.*** The applicant reports a different delivery address than was indicated in previous months.
- ***Change in Priority Class.*** The applicant reports a different end use for the fuel than was indicated in previous months.

Public Complaint. If the FCM receives a public complaint, particularly if accompanied by a written report, the application will be reviewed for possible audit.

Random Selection. At the discretion of the FCM, the computer for audit may randomly select applications, with preference given to those requesting more than 10,000 gallons of fuel. If the FCM, by using any of the three above criteria, finds suspicion of fraud, the FCM will make referral to the Attorney General.

Penalties. Any person who knowingly violates the rules and regulations of the set-aside program is guilty of (to be determined by law).

1.7 REPORTS

The Fuel Contingency Manager (FCM) shall prepare monthly status reports for distribution to the ESF-12 Group. The reports shall contain a compilation of the number and volume of applications, by fuel type. The Fuel Allocation Manager (FAM), in consultation will designate the set-aside volume up to a maximum of five percent of the total monthly supply of each fuel type available within the state. The percent volume will be determined according to the severity of the supply shortage.

1.8 SET-ASIDE PROGRAM STAFF DESCRIPTIONS

1.8.1 ECONOMIC ASSISTANCE COORDINATOR

The Economic Assistance Coordinator (ECM) will assist the ESF-12 Group. The ECM will inform the appropriate members of the Multi-Agency Task Force of the possible need for augmentation of assistance to low-income households. The coordinator will provide information concerning the potential extent and duration of economic impacts on low-income households caused by the energy supply disruption. The coordinator shall advise the energy office and ESF-12 Group of the need of additional funding for economic assistance programs. Offer proposals for increased funding and identify potential funding sources. The coordinator is responsible for briefing the task force and the FCM on implementation of the programs and success in securing additional funding. The coordinator will prepare public announcements of program availability and the application process for the Public Information Officer and the Joint Information Center at DEMA.

1.8.2 FUEL CONTINGENCY MANAGER NON-EMERGENCY MANAGEMENT TASKS

To meet needs and concerns of affected parties, all goals, objectives, and policies under consideration should be thoughtfully assessed in light of their impacts on each other as well as on currently established goals and policies. It is likely that potential conflicts will be identified during the process, necessitating the establishment of priorities for various services and functions and the determination of acceptable compromises among the range of existing and prospective goals, objectives, and policies. Specific goals and actions to be accomplished by the FCM are:

- Reduce the impact of an energy emergency on Delaware citizens, institutions, and private enterprise.
- Protect public health and safety during an emergency
- Distribute the burden of a shortage equally.
- Maintain “vital” activities.
- Minimize economic impact of the shortage.
- Cooperate with other states, with local and federal governments and with the energy industry and private business.
- Keep the public informed and advised about proper energy emergency response.

Plan Development - The fuel contingency manager (FCM) is responsible for development and coordination of the Energy Assurance Plan (EAP). This also includes assessment of personnel and financial resources.

Plan Maintenance/Revision - Because of the constant changes in this country's energy situation, responsibility for ensuring that the EAP remains current and that its contents and responses reflect effective means of dealing with an emergency. The FCM has provisions for revising the plan after the president declares an energy emergency, to make the plan reflective of the particular nature of the emergency. The FCM will stay in contact with the Delaware DEMA - Energy Response Team and maintain a current list of contact personnel (call-up) for emergencies.

Monitoring - Crises often arise without advance warning; continuous monitoring of the state's energy situation is a necessity for reduction of the impacts of sudden emergencies. This is an ongoing program by the Delaware DEMA - Energy Response Team staff.

Public Information - In an emergency, the existing energy conservation public information programs and accompanying communication networks will be expanded to encourage voluntary compliance with conservation measures.

1.8.3 FUEL CONTINGENCY MANAGER (FCM) EMERGENCY MANAGEMENT TASKS

Task areas identified for non-emergency management will be expanded by the FCM or transferred to other organizational entities in order to efficiently manage an energy emergency. Additional tasks may be needed, requiring assignment to appropriate agencies.

- **Technical Assistance** - Scattered throughout the state's organizational structure are agencies, offices, and individuals responsible for providing and utilizing training programs, technical information, workshops, and other subject-specific technical assistance on a

regular basis. Such programs will assist in further development of an emergency communication network.

- **Essential Services** - Coordination with state agencies and offices that are responsible for overseeing, administering, distributing, and/or regulating public services at both state and local levels are identified and included in the long-term planning process.
- **Local Coordination** – Coordinate with offices responsible for developing, implementing, enforcing, and monitoring local/regional plans are included in the organizational framework and communication network.
- **Simulated Emergency Exercises** - In planning for other types of emergencies it has been valuable to test the response plan and organization.
- **Plan Activation** - The governor is designated as having authority for activating the EAP; the FCM is the individual responsible for implementing the plan itself. Criteria for declaring an emergency are specified in the plan.
- **Coordination and Communication** - All entities identified in the EAP as having tasks during the energy emergency are aware of each other and have an acknowledged means of communication with each other. This formally sanctioned network clarifies roles, improves coordination, facilitates verbal communications, and permits the addition of peripheral but important groups such as industry or the news media.
- **Monitoring and demand Analysis** - During an emergency, daily monitoring, collection, and analysis of demand about the changing fuel situation and results of implementing the plan's measures will require constant attention, perhaps shifting or expanding the non-emergency functions of monitoring.
- **Public Information Programs** - It is likely that the public information efforts required in an emergency will be expanded or altered from those used during normal operations.
- **Measure Implementation** - Each measure may be implemented by a different agency, although the FCM will be responsible overall, with a variety of others accountable for enforcement.
- **Impact Assessment** - Monitoring social, economic, and environmental impacts is the responsibility of the FCM so that scope, depth, and interrelationships of impacts may be observed systematically. Impact assessment, however, will require a diversity of expertise and personnel.
- **Measure-Generated Crisis Identification** - Responsibility for dealing with hardships created by government actions will be considered along with impact assessment.
- **Measure-Generated Crisis Mitigation** - Identifying specific methods for reducing these crises is the responsibility of the FCM and other agencies at local levels. This responsibility includes implementing, enforcing, and monitoring the response efforts.
- **Plan Deactivation** - The FCM is responsible for determining when the emergency is over and how emergency actions are to be phased out.
- **Post-Emergency Assessment** - The FCM is responsible for developing the plan, and a task force representing all the agencies involved in carrying out an emergency plan may produce the assessment.

1.8.4 FUEL INDUSTRY LIAISON BY DELAWARE DEMA - ENERGY RESPONSE TEAM

The Delaware DEMA - Energy Response Team performs many activities relevant to emergency situations on an ongoing basis. The ongoing normal operations for the fuel industry liaison involved in the pre-emergency planning will be expanded during emergency operations. The fuel industry liaison has a trusted relationship with petroleum industry personnel in critical positions who can assist in describing the seriousness and length of any interruption in fuel supply to Delaware. This special liaison and relationship with petroleum industry personnel will allow the fuel industry liaison special consideration in obtaining fuel information during emergency situations. It must be noted that most all of the reports including raw material and background information must remain confidential and cannot be made a matter of public record in order to maintain the ongoing working relationship with the petroleum industry. The tasks of the fuel industry liaison are described below and placed within the existing organizational structure so that expansion in an emergency situation can occur with a minimum of disruption. Specific tasks include researching, recording, and preparing periodic reports of significant trends in Delaware regarding the petroleum industry for the FCM. They will enable the FCM to have an early warning capability of a potential fuel crisis affecting Delaware. This information is derived from:

- Researching and recording monthly demand on crude oil imports, finished product imports, refinery production and refinery capacity for total United States.
- Keeping track of and secure publications from National Association of Refiners on specific refinery operations including closing, remodeling and mothballing of specific refineries.
- Obtaining dealer cost prices on gasoline on a specific demand each month and obtaining a street survey of major and independent service station prices to arrive at dealer margins on each grade of gasoline for both self-service and full-service offerings.
- Researching and recording monthly sales of gasoline and gallons in Delaware.
- Recording and recapping lifting from pipelines and Delaware refineries plus neighboring state refineries that truck in any significant amounts of gasoline.
- Recording and reporting Delaware Department of Transportation (DOT) taxable gallons and 90% of gasohol gallons monthly.
- Providing information to citizens regarding the availability of petroleum products and complaints needing explanation of market place functions.
- Maintaining custody of materials used historically in functions of fuel allocations during shortages.

1.8.4.1 FUEL INDUSTRY LIAISON REPORTS

Again, It must be noted that all reports including background information must remain confidential and cannot be made a matter of public record in order to maintain the relationship with the petroleum industry.

- Prepare a continuing 12-month moving total demand curve report that compares with the total United States demand curve. The information for this report is obtained from the Department of Energy reporting sales into Delaware.

- Record and prepare lifting numbers from pipelines and Delaware refineries plus neighboring state refineries that truck in any significant amounts of gasoline.
- Periodically prepare trends analysis reports.

1.9 SET-ASIDE PROGRAM IMPLEMENTATION

The success of the Set-Aside Program depends upon its management and the degree of preparedness of the individuals involved in its implementation. To the extent that the staff is trained, understands the plan, and carries out the duties of their positions, the plan will become operational at the critical time.

1.9.1 KEY POSITIONS GENERAL DESCRIPTIONS

The Fuel Contingency Manager (FCM) will direct staff to proceed with specific elements of the plan. Using the demand and analysis provided by staff, the FCM may present recommendations to the ESF-12 Advisory Group. The Fuel Allocation Manager (FAM) is responsible for supply monitoring, demand collection, program implementation and maintenance of a log of all activities. The public information staff (JIC) schedules briefings for the press and coordinates with the Delaware DEMA - Energy Response Team. The public information staff is also responsible for disseminating accurate information to the general public, advising them on the status of the situation and providing guidelines encouraging emergency energy demand reduction. If an energy emergency is proclaimed, the Delaware DEMA - Energy Response Team implements the energy emergency response programs.

1.9.2 FUEL INDUSTRY LIAISON MANAGER (FILM)

The fuel industry liaison performs many activities relevant to emergency situations on an ongoing basis. The ongoing normal operations for the fuel industry liaison involved in the pre-emergency planning will be expanded during emergency operations. The fuel industry liaison has a trusted relationship with petroleum industry personnel in critical positions who can assist in describing the seriousness and length of any interruption in fuel supply to Delaware. This special liaison and relationship with petroleum industry personnel will allow the fuel industry liaison special consideration in obtaining fuel information during emergency situations. It must be noted that most all of the reports including raw material and background information must remain confidential and cannot be made a matter of public record in order to maintain the ongoing working relationship with the petroleum industry. The tasks of the fuel industry liaison are described below and placed within the existing organizational structure so that expansion in an emergency situation can occur with a minimum of disruption. FILM tasks include researching, recording, and preparing periodic reports of significant trends in Delaware regarding the petroleum industry for the FCM. They will enable the FCM to have an early warning capability of a potential fuel crisis affecting Delaware. This information is derived from:

- Researching and recording monthly demand on crude oil imports, finished product imports, refinery production and refinery capacity for total United States.
- Keeping track of and secure publications from National Association of Refiners on specific refinery operations including closing, remodeling and mothballing of specific refineries.

- Obtaining dealer cost prices on gasoline on a specific demand each month and obtaining a street survey of major and independent service station prices to arrive at dealer margins on each grade of gasoline for both self-service and full-service offerings.
- Researching and recording monthly sales of gasoline and gallons in Delaware.
- Recording and recapping lifting from pipelines and Delaware refineries plus neighboring state refineries that truck in any significant amounts of gasoline.
- Recording and reporting Delaware Department of Transportation (DOT) taxable gallons and 90% of gasohol gallons monthly.
- Providing information to citizen inquiries regarding the availability of petroleum products and complaints needing explanation of market place functions.
- Maintaining custody of materials used historically in functions of fuel allocations during shortages.

1.9.2.1 FUEL INDUSTRY LIAISON REPORTS

Again, it must be noted that all reports including background information must remain confidential and cannot be made a matter of public record in order to maintain the relationship with the petroleum industry.

- Prepare a continuing 12-month moving total demand curve report that compares with the total United States demand curve. The information for this report is obtained from the Department of Energy reporting sales into Delaware.
- Record and prepare lifting numbers from local fuel suppliers, pipelines, plus neighboring state refineries that truck in any significant amounts of gasoline.
- Periodically prepare trends analysis reports.


1.10 SET-ASIDE PROGRAM IMPLEMENTATION

The success of the Set-Aside Program depends upon its management and the degree of preparedness of the individuals involved in its implementation. To the extent that the staff is trained, understands the plan, and carries out the duties of their positions, the plan will become operational at the critical time.


1.10.1 OPERATING GUIDELINES

A set of Operating Guidelines was developed for each position on the EAP emergency response organization chart. Each phase of the SEAP has a complete set of operating guidelines, providing a checklist of specific duties and responsibilities.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

 Emergency Waiver of Commercial Motor Vehicle Hours Department of Natural Resources and Environmental Control Delaware State Energy Office 1203 College Park Drive, Suite 101 - Dover, DE 19904 Tel#: (302) 735-3480 Fax: (302) 739-1540 Attn: Charlie Smisson, State Energy Program Manager	
This Section is Completed By Carrier	
Company Name:	Date Submitted:
Company Address:	
City:	State: Zip:
Contact Person:	Phone: Fax:
E-Mail:	Date Submitted:
Duration of Request – Beginning:	Duration of Request – Ending:
Reason for Request:	
This Section is Completed By Delaware Energy Office	
Date and Time Received:	
Type of Operation:	
Extent of Exemption:	
Effective Date:	Termination Date:
Special Conditions: 1. Limited to operations of vehicles making propane and/or heating fuel deliveries to residential or commercial establishments within the State of Delaware and operations of vehicles transporting heating fuels from terminal locations to heating fuel delivery companies. 2. Exemption is from the requirements of the 60/70 - hour rule only. 3. Drivers must still comply with the 10-hour maximum driving time and 15-hour maximum driving and on-duty time limitations. 4. Exemption may only be used when all drivers in a company have reached the 60/70 - hour limitation and deliveries are necessary to ensure continuation of heating services at a residential or commercial establishment.	
Note:	
Signature:	Date:
State Energy Coordinator, Delaware Energy Office	
This Section is Completed By Delaware Energy Office	
Date and Time Received:	
Note:	
Signature:	Date:
Director, Delaware Emergency Management Agency	

B-8 [Driver-Hour-Waiver-Form](#)

 Delaware State Set-Aside Propane Motor Fuel Allocation Monthly Report of Producers Privately Held Into the State of Delaware Department of Natural Resources and Environmental Control - Delaware State Energy Office 1203 College Park Drive, Suite 101 - Dover, DE 19904 - Phone: (302) 735-3480 Fax: (302) 739-1540 Attn: Charlie Smisson, State Energy Program Manager						
Part I: Identification Data						
Date of This Report:						
Month:	Year:					
Part II: Motor Fuel Distribution Information						
Month: Day: Year:						
Fuel Type: Propane Gasoline Diesel Other:						
Part III: Allocation Data (Report all volumes in Thousands of Gallons)						
Product	Allocation (A)	Actual Sales (B) (For the reference of users when the allocation is used and to determine the total for comparison during month (B))	Propane Sales (C) (For the reference of users when the allocation is used and to determine the total for comparison during month (C))	Total Propane Sales (D) (B + C)	Propane Sales (E) (B + C)	Allocation Factor (F) (D / E)
Regular Gasoline	0%	0	0	0	0	0
Mid-Grade Gasoline	0%	0	0	0	0	0
Premium Gasoline	0%	0	0	0	0	0
Low Sulfur Diesel	0%	0	0	0	0	0
High Sulfur Diesel	0%	0	0	0	0	0
Gasoline	0%	0	0	0	0	0
Gas. 2 Plus (20/100/150)	0%	0	0	0	0	0
Aviation Gasoline	0%	0	0	0	0	0
JET-A-1 (Commercial Aircraft)	0%	0	0	0	0	0
JET-B (Propeller Aircraft)	0%	0	0	0	0	0
Propane	0%	0	0	0	0	0
Part IV: Certification (I certify that the foregoing information is true and correct to the best of my knowledge.)						
Signature:	Date:					
State Energy Coordinator						
Part V: Allocation Data (Report all volumes in Thousands of Gallons)						
Month: Day: Year:						
Fuel Type: Propane Gasoline Diesel Other:						
Allocation Factor (F) (D / E)						

B-9 [Set-Aside-Program-Fuel-Allocation-Form/demand base](#)

APPENDIX C – FUEL REDUCTION MEASURES

1. ODD-EVEN DISTRIBUTION

1.1 DESCRIPTION

In a moderate shortage situation, the need for a method to alleviate the long lines at retail service stations may arise. To avoid the hardship and inconvenience to the motoring public often associated with long lines at the pumps, and to assure the equitable distribution of gasoline to all potential users, the Governor, through an emergency declaration, may authorize the Delaware Energy Office (Delaware Energy Response Team) to implement an Odd/Even Distribution Measure. 821,618 vehicles were registered in the state of Delaware as of May 1, 2005. Delaware's License plates are neither embossed nor de-bossed. They are created with a silk-screening process and are flat. License plates in Delaware feature up to six numbers. Prefixes indicated what type of vehicle or license plate.

1.2 PURPOSE AND OBJECTIVES

This measure is designed to assist in the equitable allocation of gasoline to consumers. It may additionally encourage the conservation of fuel by causing trips to be better planned. Minimizing waiting lines may also reduce consumption by saving fuel that is used while idling.

1.3 IMPLEMENTATION PROCEDURES

Under this plan, gasoline may be purchased or sold only in accordance with the following procedures:

- On odd/numbered days of the month, gasoline should only be sold to and purchased by the operator of a vehicle bearing license plates of which the last number is odd. Most Delaware license plates end with three numbers. License plates odd numbers may purchase fuel on odd days.
- On even-number days of the month, gasoline should only be sold to and purchased by the operator of a vehicle bearing Delaware license plates with even license plates numbers. Personalized license plates will follow ending letters of A - M on odd days and N - Z on even days. (Note: Personalized license plates ending in numbers will follow the schedule for license plate numbers.
- This plan should be implemented in accordance with the Minimum Fuel Purchase Measure.

1.4 EXEMPTIONS

Exemptions to the Odd/Even Measure will be made for the following vehicles:

- Vehicles used in agriculture
- Police, fire, ambulance, or other emergency vehicles.
- Vehicles operated as common carriers or contract carriers.
- Energy production and distribution vehicles.
- Vehicles rented for less than thirty days.
- Telecommunications vehicles.
- Sanitation services vehicles
- Motorcycles, scooters, and mopeds.
- Vehicles operated by or on behalf of the handicapped or disabled.
- Vehicles used in authorized vanpools and carpools.
- Such other vehicles as the Delaware Energy Response Team Fuel Allocation Manager may determine.

The Delaware Energy Response Team Fuel Allocation Manager will have responsibility for review and approval of applications for exemption from this measure. The Delaware Energy Response Team Fuel Allocation Manager may exempt from the application of Odd/Even and Minimum Purchases Measures any person or class for whom participation would result in a severe, immediate and continuing danger to the health, safety or welfare of one or more persons or rendering impossible the actual performance of any trade, occupation or profession by such person or class.

Application for such exemptions from this measure should be made through the Delaware Energy Response Team. Prior to granting any exclusion

exemption, the Delaware Energy Response Team may require such documentary evidence and supporting material as is deemed necessary, including: Pertinent statistical information relating to the consumption of gasoline; Business, medical, governmental or social services records, as required on a case-by-case basis; Business, medical, governmental or social services certification setting forth specific facts showing that the exemption is warranted under the criteria set. Upon approval by the Delaware Energy Response Team, applicants will be issued a special permit exempting them from the above procedure. The permit must be shown upon the purchase of gasoline, and must be renewed every 60 days.

1.5 REQUIREMENTS FOR RETAIL GASOLINE OUTLETS

No hours of operation are imposed on retail gasoline sales outlets in this measure. However, operators of retail gasoline sales outlets are encouraged to continue the sale of motor gasoline a prudent manner, while attempting to pace the sales so that the available fuel is not exhausted prior to the end of the month. Retail sales outlets in the same general area are encouraged to stagger the days or hours they will close. In order to minimize inconvenience to motorists

Alert Levels and Phases at Which Measures are Implemented and Types of Compliance (Figure C-1)				
Measures	Readiness Phase I	Verification Phase II	Pre-Emergency Phase III	Emergency Phase IV
Public Information	●	●	●	★
Odd/Even Gasoline Purchase			●	★
Minimum Purchase			●	★
Maximum Fuel Purchase			●	★
Extended Purchase Measure			●	★
Speed Limit Enforcement			●	★
Parking & Alternative Transportation	●	●	●	★
Promotion of Bicycle Riding	●	●	●	★
Employer-Based Travel Program		●	●	★
Compressed Workweek		●	●	★
School System			●	★
Ride Sharing and Van Pooling	●	●	●	★
Vehicle Maintenance Program	●	●	●	★

Caused by weekend closings, all retail having sales volume in excess of 100,000 gallons annually will be encouraged to participate in the following voluntary system for ensuring staggered hours of operation among stations located in the same area:

- Those retail service stations having a sales tax number ending in an even digit shall remain open and pumping gasoline on Saturday.
- Those retail service stations having a sales tax number ending in an odd digit shall remain open and pumping gasoline on Sunday.
- All participating stations would be asked to remain open and pumping gasoline for at least four hours on their respective day of weekend operation. However, no service station would be required to sell more than one-sixth of its weekly allocation. Service stations would be required to post their days and hours of operation clearly and prominently. In addition, the Delaware Energy Response Team may encourage the adoption of a flag system to indicate availability of various services. A green flag would indicate selling of gas; the red flag would mean station closed, and the yellow flag would mean the gas station is open for service only.

1.6 ADVANTAGES AND DISADVANTAGES

There are a number of advantages to using the Odd/Even Distribution Measure. An important advantage is that this measure helps to space purchases of gasoline and aids in its equitable distribution. The measure has the potential effect of shortening lines at gasoline retail outlets by cutting in half the number of customers that may attempt to get gasoline on any given day.

As far as the public is concerned, this measure probably is the most familiar and the easiest to understand. The Odd/Even Distribution Measure may also provide a psychological benefit by reducing uncertainty regarding fuel availability.

Delaware Energy Response Team will be required to implement the plan. The Odd/Even Measure combines minimum costs and easy implementation requirements. The expenses involved would be limited to the administration of exemptions and the dissemination information. Implementation steps would be few and could usually be accomplished in about a week.

The major disadvantage to the Odd/Even Measures is that it does not directly save any calculable amount of gasoline; it is designed as a distribution aid and not a conservation measure. This measure would be difficult for the Delaware Energy Response Team to enforce; the bulk of the enforcement responsibility rests with service station personnel. It is believed that service station personnel do not want to enforce this measure for fear that it might expose them to personal physical harm. Enforcement may also be difficult due to the large number of self-service and automatic gasoline pumps. These stations may find it hard to determine if a customer is in compliance with the measure without changing their system of operation. The measure could potentially produce adverse psychological effects. There is the chance that it could increase the incidence of "tank-topping" and in this way complicate the shortage. The implementation of this measure may actually increase lines by having the public habitually purchase gasoline every other day.

A local problem may result where there is a high concentration of vehicles registered in other states. This would generally be limited to areas that contain major universities or military bases. Out-of-state vehicles (except for those registered in contiguous states), although primarily driven in the local area or the state, would be exempt from the Odd/Even restrictions. This would give them an unfair advantage over other local consumers.

1.7 ESTIMATED ENERGY SAVINGS

The primary effect of an Odd/Even measure would be to distribute the available supply of gasoline in an equitable manner among consumers and in so doing reduce the size of vehicle queues at the pump; it is not by nature a fuel-conserving measure. The effects of the Odd/Even Measure on the economy of Delaware would be due in large part to the allocation action that would be served by the measure. Restrictions on time and amount of gasoline purchase tend to reduce the number of trips made for various purposes and possibly overall travel. Their effects on various sectors of the state's economy would be roughly in proportion to the importance of the trip contemplated, which is, in turn, dependent on the priorities individuals would assign to possible trip purposes.

1.8 PRIVATE SECTOR COSTS

The impact on the industrial, professional, and governmental sectors would be relatively minimal, with respect to both employment and productivity, and in the case of industry, the transport of goods. Travel to place of employment is generally considered a high-priority trip purpose. Therefore, the use of gasoline for work trips would likely take precedence over the use for other trip purposes. Impacts on the transport of goods would be small due to the fact that the measure makes allowances for commercial vehicles. It is not likely that the measure will appreciably affect the retail/commercial sector, since it contains no restrictions on the amount of

fuel that could be purchased. Any impact on consumer purchases would probably be limited to a rearrangement or combination of trips, an act, which would not in any way affect actual sales.

The sector which would probably be most affected would be the recreation and tourism business. Relatively long travel distances and a relatively low priority ranking among consumers characterize recreational travel. The extent to which such travel would be affected is dependent on the perceptions of individual motorists regarding the availability of gasoline for a proposed trip. Uncertainty may compel a motorist to forgo pleasure travel rather than risk the possible inconveniences of long lines, frequent stops, or being unable to obtain gasoline in a particular area. On the other hand, if uncertainty could be reduced or eliminated in some manner, for example through a regulation requiring the staggering of operating hours of retail service stations, then the impact of the Odd/Even Measure on recreational travel would be minimal.

1.9 DELAWARE ENERGY RESPONSE TEAM IMPLEMENTATION

The Delaware Energy Response Team is responsible for implementation of the Odd/Even Measure. The Delaware Disaster Act authorizes the Governor to declare an energy emergency (fuel shortage) and to declare effective any emergency orders, rules and/or regulations as necessary. The affected retail facilities shall be notified that the measure is in effect. The retailers must be informed of all requirements and provisions set forth in the measure, including the rules for allocation by license plate number, as well as the plan for staggering weekend operating hours among stations in the same area on the basis of sales tax numbers. It should be reiterated that weekend operation on a staggered basis is to be recommended, but not required. The Delaware Association of Retail Marketers could assist in the above tasks.

1.10 ENFORCEMENT AND COMPLIANCE

Violation of the regulations of the Odd/Even Measure will constitute a misdemeanor punishable in accordance with Delaware General Statutes. State, county and municipal law enforcement agencies will have the authority to issue citations for any violation of the provisions of this measure. Any appeals of citations will make to the Delaware Energy Response Team.

Problems are likely to arise in the enforcement of the measure, one being the added burden that will be placed on law enforcement agencies. If additional law enforcement personnel are hired to assume the added responsibility, this will be costly. These costs should be estimated and provisions made for allocating additional funds to local law enforcement agencies (under the Delaware Disaster Act). Citations for violation of the Odd/Even Measure would only increase the already excessive load on the courts. Thus, under normal circumstances, a warning notice will first be issued upon discovery of violation of this or other components of the emergency program.

1.11 TECHNICAL ASSISTANCE PROVIDED BY THE DELAWARE ENERGY RESPONSE TEAM

The Delaware Energy Response Team shall provide assistance necessary for implementation and administration as outlined in this plan.

2.0 IMPLEMENTATION

2.1 DESCRIPTION, PURPOSE, AND OBJECTIVES

2.2 IMPLEMENTATION PROCEDURES

The primary function of the minimum purchase requirement is to allocate the sale of gasoline and reduce or minimize gasoline lines by discouraging the making of frequent but small gasoline purchases by consumers.

In this measure, each motorist may be required to purchase a specified minimum amount of gasoline per visit to a retail fuel sales facility.

Exemptions:

This measure shall not apply to:

- Vehicles used in agriculture.
- Police, fire, ambulance, and other emergency vehicles.
- Vehicles operated as common carriers or contract carriers.
- Energy production and distribution vehicles.
- Van pool vehicles as designated by the exemption procedures.
- Sanitation service vehicles.
- Telecommunication vehicles.
- Passenger transit or Para-transit vehicles (Para-transit Service for individuals with disabilities that prevent them from riding the fixed route buses).
- Vehicles rented for less than thirty days.
- The filling of portable containers
- Such other motor vehicle classifications as the Delaware Energy Response Team may determine.

In addition to the exemptions listed above, vehicles used routinely and primarily in the conveyance of handicapped persons and vehicles determined to be essential to community wellbeing and health will be exempted from the plan, upon application to and approval by the Delaware Energy Response Team. In addition to the exemptions listed, vehicles used routinely and primarily in the conveyance of handicapped persons, and vehicles determined to be essential to community well being and health, will be exempted from the plan, upon application to and approval by the Delaware Energy Response Team.

2.3 STAGE OF IMPLEMENTATION

Minimum fuel purchase is considered a **mandatory** measure and would be implemented during a Phase II or III emergency. This conservation measure should be implemented in conjunction with the Odd/Even Distribution Measure.

2.4 ADVANTAGES AND DISADVANTAGES

The primary advantage of the Minimum Purchase Measure is that of discouraging tank topping. Thus it is useful in reducing gasoline queues, preventing the additional consumption of gasoline that results from waiting in a queue. Another advantage of the Minimum Purchase Measure is its low cost and ease of implementation relative to odd-even conservation. One major disadvantage of the Minimum Purchase Measure is the difficulty of effectively enforcing the measure, especially at self-service facilities. Service station personnel are particularly likely to be unwilling to demand compliance from customers. Another negative aspect of the measure is that it places an inequitable burden on low-income drivers and drivers of vehicles having relatively small fuel tank capacities.

2.5 ESTIMATED ENERGY SAVINGS

The primary advantage of the Minimum Purchase Measure is that of discouraging tank topping. Thus it is useful in reducing gasoline queues, preventing the additional consumption of gasoline that results from waiting in a queue. Another advantage of the Minimum Purchase Measure is its low cost and ease of implementation relative to odd-even conservation. One major disadvantage of the Minimum Purchase Measure is the difficulty of effectively enforcing the measure, especially at self-service facilities. Service station personnel are particularly likely to be unwilling to demand compliance from customers. Another negative aspect of the measure is that it places an inequitable burden on low-income drivers and drivers of vehicles having relatively small fuel tank capacities.

2.6 PRIVATE SECTOR COSTS

The effects of the combined Minimum Purchase and Odd/Even Measures on the economy of the state would be due in large part to the allocation function that would be served by the measure. Restrictions on time and amount of gasoline purchase tend to reduce, if not overall travel, the number of trips made for various purposes. Their effects on various sectors of the city's economy would be roughly in proportion to the importance of the trip contemplated, which is, in turn, dependent on the priorities individuals would assign to possible trip purposes.

The impact on the industrial, professional, and governmental sectors would be relatively minimal, with respect to both employment and productivity, and in the case of industry, the transport of goods. Travel to place of employment is generally considered a high-priority trip purpose; therefore, the use of gasoline for work trips would likely take precedence over its use for other trip purposes. Impacts on the transport of goods would be small due to the fact that the measure makes allowances for commercial vehicles.

Some impact on the retail and commercial sector could occur since discretionary travel, which includes shopping trips, is more flexible than home-to-work travel, and travel reductions could be more feasibly made in this category. Even so, the significance of this impact is questionable, as consumer response might simply be to rearrange or combine trips, rather than eliminate them outright. Probably some consumers affected would be those in which the consumer purchase decision was spontaneous or unplanned; such sales probably make up only a small percentage of total retail sales. The minimum purchase aspect of the measure could conceivably stimulate sales by encouraging motorists to make nonessential trips on gasoline purchase days for the purpose of reducing gasoline in the tank to a level, which would permit.

The sector which would probably be most affected would be the recreation and tourism business. A fair amount of travel within the state is for the pursuit of leisure or vacation activities. Relatively long travel distances and relatively low priority ranking among consumers characterize recreational travel. The extent to which such travel would be affected is dependent on the perceptions of individual motorists regarding the availability of gasoline for proposed trip. Uncertainty may compel a motorist to forgo pleasure travel rather than risk the possible inconveniences of long lines, frequent stops, or being unable to obtain gasoline in a particular area. On the other hand, if uncertainty could be reduced or eliminated in some manner, for example, through a regulation requiring the staggering of operating hours of retail service stations, then the impact of the Minimum Fuel Purchase - Odd/Even Measure on recreational travel would be minimal.

2.7 DELAWARE ENERGY RESPONSE TEAM IMPLEMENTATION

The responsibility for implementation of the Minimum Fuel Purchase Measure will be a process of an energy emergency declaration by the State of Delaware References:

State: The state's authority for preparing the plan is sections Title 20, Delaware Code, Chapter 31, 3101, 3102, 3107, and 3115^[1] that govern the state energy emergency response activities. Article IV, Constitution of the State of Delaware; entitled the "Executive Department"

Federal: Title VI of PL 93-288, as amended, The Robert T. Stafford Disaster Relief and Emergency Assistance Act.

Upon declaration of an energy emergency by the Governor, the Delaware Emergency Management Agency (DEMA), and the Delaware Energy Office (Delaware Energy Response Team) shall notify all affected retail facilities that the plan is in effect and shall inform them of all requirements and provisions set forth in the measures. This will include the smallest allowable minimum purchase amount that the retailer may set, as well as the action of staggering of weekend operating hours among stations in the same area, on the basis of sales tax numbers. It should be reiterated that weekend operation on a staggered basis is to be recommended, but not required.

3.0 MAXIMUM FUEL PURCHASE MEASURE

3.1 DESCRIPTION PURPOSES AND DESCRIPTION

The Maximum Fuel Purchase Measure (MFPM) is intended as a means of ensuring that, in the event of a shortage of gasoline and/or diesel supplies, some gasoline will be available to all motorists located or traveling through the state. The rationale behind the measure is that limiting the amount of gasoline that one motorist can purchase during a particular visit can be expected to prevent the supply of gasoline allocated to a particular retailer from being exhausted prematurely.

3.2 PROCEDURE

Under the MFPM, each purchaser will be restricted to a certain maximum quantity of gasoline upon each visit to a service station. The maximum purchase quantity will be set by the Delaware Energy Response Team and may be set lower at the discretion of the retailer. Market

forces may act in such a way to compel service station and other gasoline retailers to set maximum purchase limits on their own in the event of a gasoline/diesel shortage. It is suggested that the restriction be based on quantity of gasoline/diesel rather than purchase price in order to eliminate the need for continual revision of limits to reflect price increases. This measure is intended to be implemented on a voluntary basis but in a severe emergency could be implemented as a mandatory measure.

3.3 EXEMPTIONS

This measure shall not apply to:

- Vehicles used in agriculture.
- Police, fire, ambulance, and other emergency vehicles.
- Vehicles operated as common carriers or contract carriers.
- Energy production and distribution vehicles.
- Van pool vehicles as designated by the exemption procedures.
- Sanitation service vehicles.
- Telecommunication vehicles.
- Passenger transit or Para-transit vehicles (Para-transit Service for individuals with disabilities that prevent them from riding the fixed route buses).
- Vehicles rented for less than thirty days.
- The filling of portable containers
- Such other motor vehicle classifications as the Delaware Energy Response Team may determine.

In addition to the exemptions listed, vehicles used routinely and primarily in the conveyance of handicapped persons and vehicles determined to be essential to community well-being and health will be exempted from the plan, upon application to and approval by Delaware Energy Response Team.

3.4 STAGE OF IMPLEMENTATION

Maximum Fuel Purchase should only be implemented under conditions of a moderate or severe shortage (Phase II or III). A significant disadvantage of the measure is the difficulty involved in monitoring compliance and enforcement, if implemented as a mandatory measure. Service station operators are likely to be unwilling to enforce the measure, and few if any law enforcement agencies have the staff or resources necessary to ensure a high rate of compliance.

3.5 ESTIMATED ENERGY SAVINGS

For the purpose of considering possible energy savings, the MFPM will be combined with an Odd/Even Measure, which follows essentially the same form as the Odd/Even Measure being treated individually for this plan. There is a potential for gasoline savings inherent in a combined Maximum Purchase - Odd/Even Measure in that it would limit both the quantity of fuel that could

be purchased and the amount of time during which a purchase could be made. However, skepticism and uncertainty on the part of the motorist regarding gasoline supplies and operating hours of individual stations may encourage tank-topping, particularly in cases where the motorist wants to be certain of having an adequate supply of fuel stored in the tank going into a non-purchase day.

3.6 PRIVATE SECTOR COSTS

The effects of the combined Maximum Purchase - Odd/Even Measure on the economy of Delaware would be due in large part to the distributive function that would be served by the measure. Restrictions on time and amount of gasoline purchase tend to reduce, if not overall travel, the number of trips made for various purposes. Their effects on various sectors of the state's economy would be roughly in proportion to the importance of the trip contemplated, which is in turn, dependent on the priorities individuals would assign to possible trip purposes.

The impact on the industrial, professional and governmental sectors would be relatively minimal, with respect to both employment and productivity, and in the case of industry, the transport of goods. Travel to place of employment is generally considered a high-priority trip purpose. Therefore, the use of gasoline for work trips would likely take precedence over its use for other trip purposes. Impacts on the transport of goods would be small due to the fact that the measure makes allowances for commercial vehicles.

The impact on the retail and commercial sectors could be expected to be slightly greater since travel in this instance is more of a discretionary nature. The actual extent to which sales would be affected is dependent on whether consumers choose simply to combine or rearrange trips or to eliminate them altogether under a Maximum Purchase - Odd/Even restriction. Even so, the only sales likely to be affected are that made to consumers whose decision to purchase is spontaneous or unplanned. Such sales probably make up only a small percentage of total retail sales.

The sector which would probably be most affected would be the recreation and tourism business. A fair amount of travel within the state is for the pursuit of leisure or vacation activities. Relatively long travel distances and relatively low priority ranking among consumers characterize recreational travel. The extent to which such travel would be affected is dependent on the perceptions of individual motorists regarding the availability of gasoline for a proposed trip. Uncertainty may compel a motorist to forgo pleasure travel rather than risk the possible inconveniences of long lines, frequent stops, or being unable to obtain gasoline in a particular area. In the case of a maximum purchase amount restriction, the prospect of having to make frequent stops on a long trip may be particularly influential on the motorist's decision. On the other hand, if uncertainty could be reduced or eliminated in some manner, for example through a regulation requiring the staggering of operating hours of the retail service stations, then the impact of the Maximum Purchase - Odd/Even Measure on recreational travel would be lessened.

4.0 EXTENDED PURCHASE MEASURE

4.1 DESCRIPTION

4.1.1 PURPOSE AND OBJECTIVES

The Extended Purchase Measure (EPM) may be implemented to aid in the equitable distribution of motor fuels to consumers, to alleviate the long lines at retail service stations, or in the event that the Odd/Even Distribution Measure does not mitigate these conditions. Most likely, EPM will be implemented in a severe emergency as an extension of the Odd/Even Measure. In addition, it may encourage the conservation of fuel by exemplifying to consumers the severity of the situation.

This measure operates in many ways like the Odd/Even Measure in that it is designed to allow for the equitable allocation of motor fuels to consumers. With the implementation of EPM, motor fuel purchases would be restricted to every fourth day based on the vehicle's license plate number

4.2 IMPLEMENTATION PROCEDURES

Under this plan, motor fuels may be purchased or sold only in accordance with the following procedure:

- On odd/numbered days of the month, gasoline should only be sold to and purchased by the operator of a vehicle bearing license plates of which the last number is odd. Most Delaware license plates end with three numbers. License plates odd numbers may purchase fuel on odd days.
- On even-number days of the month, gasoline should only be sold to and purchased by the operator of a vehicle bearing Delaware license plates with even license plates numbers. Personalized license plates will follow ending letters of A - M on odd days and N - Z on even days. (Note: Personalized license plates ending in numbers will follow the schedule for license plate numbers. For a list of various plates offered [click here](#).)
- Vehicles used in agriculture.
- Police, fire, ambulance, and other emergency vehicles.
- Vehicles operated as common carriers or contract carriers.
- Energy production and distribution vehicles.
- Van pool vehicles as designated by the exemption procedures.
- Sanitation service vehicles.
- Telecommunication vehicles.
- Passenger transit or Para-transit vehicles (Para-transit Service for individuals with disabilities that prevent them from riding the fixed route buses).
- Vehicles rented for less than thirty days.
- The filling of portable containers

- Such other motor vehicle classifications as the Delaware Energy Response Team may determine.

In addition, vehicles in Delaware that are licensed in contiguous states are not exempt from this measure. In the event this measure is implemented, the Delaware Energy Response Team should coordinate its efforts with other state energy offices to make them aware of the provisions of this measure since it would apply to contiguous states and cities vehicles coming into Delaware. Service station operators would be required to serve any vehicle not licensed in Delaware, regardless of plate number or day of the month. The Delaware Energy Response Team shall waive responsibility for review and approval of applications for exemption. Prior to granting any exemption, the Delaware Energy Response Team shall require such documentary evidence of pertinent information relating to the consumption of motor fuels.

4.3 REQUIREMENTS FOR RETAIL MOTOR FUELS OUTLETS

No hours of operation are imposed on retail motor fuels sales outlets in this measure. However, operators of retail motor fuels sales outlets are encouraged to continue the sale of motor fuels in a prudent manner, while attempting to pace the sales so that the available fuel is not exhausted prior to the end of the month. Retail sales outlets in the same general area are encouraged to stagger the days or hours they will close.

In order to minimize inconvenience to motorists caused by weekend closings, all retail stations having sales volume in excess of 100,000 gallons annually will be encouraged to participate in the following voluntary system for ensuring staggered hours of operation among stations located in the same area. This includes retail service stations having a sales tax number ending in an even digit shall remain open and pumping motor fuels on Saturday. Retail service stations having a sales tax number ending in an odd digit shall remain open and pumping motor fuels on Sunday.

All participating stations would be asked to remain open and pumping motor fuels for at least four hours on their respective day of weekend operation. However, no service would be required to sell more than one-sixth of its weekly allocation. Stations may be required to post their days and hours of operation clearly and prominently.

5.0 SPEED LIMIT ENFORCEMENT MEASURE

5.1 PURPOSE AND OBJECTIVES

The overall goal of the speed limit enforcement measure is to achieve maximum energy savings through increased compliance with existing speed limits and to make use of the conservation potential of further reductions in driving speeds by trucks, buses and autos. After the OPEC oil embargo of 1973-1974, the Congress enacted, in January 1974, the Emergency Highway Transportation Act (Public Law 93-239), which required each state to adopt and enforce a 55 mile-per-hour (MPH) speed limit law. States, which failed to enforce the law to achieve designated levels of compliance, faced the loss of funding for federal highway construction. As a result, all states adopted this 55 MPH speed limit during 1974-1975 (see "Backgrounder on Highway Speeds on Appendix E-3).

After passage of the law by the states, average speed reductions across highway types were evidenced, particularly on the Interstate system. The average speed reductions led to

corresponding savings in fuel. However, these fuel savings have been eroding somewhat over time, as average highway speeds have been gradually climbing (National & Highway Traffic Safety Administration, 55 MPH Fact Book, 1978), although not to pre-embargo levels.

Thus, the idea behind this measure is to regain this source of energy savings by an increased level of enforcement activity to assure targeted levels of compliance. Most of the state and federal publications dealing with this issue have set the target at 70 percent compliance across all road types. Because of the extremely low probability of apprehension even with increased enforcement manpower, it is felt that the 70 percent goal is reasonable. Full compliance is probably not achievable, and the enforcement costs associated to achieve such a target would almost certainly render this degree of compliance non-cost-effective.

5.2 IMPLEMENTATION PROCEDURES

Operating Agencies: If the decision is made to implement this Speed Limit Measure, either by the state or by the federal government, then Delaware is in a position to act positively and quickly. Because of the state's many miles of rural paved roads, the great majority of the 55 MPH enforcement responsibility would revert to the Delaware State Police (DSP). Most of the necessary manpower would already be in place. Increased effort by local government police departments could also assist in the measure. Additional Considerations are:

- Increase the penalties for violating the speed limit laws, either in terms of points assessed against a driver record or amount of fine, or both. If penalties are increased, they should be kept in proper perspective so that the DSP and local government police departments and the courts are willing to enforce the measure.
- Impose no constraints on the DSP and local government police departments insofar as use of the most modern enforcement tools or techniques is concerned.
- Clarify or streamline state laws to allow for rapid and equitable prosecution of the increased number of violators that will likely arise. With court dockets already extremely burdened, this is no small issue.

Public Information and Education: Along with all of the above, it is imperative that the public be kept completely informed of the changes that are to take place, especially in regard to enforcement levels and techniques and any changes in the penalties associated with speed limit violation. However, it is hoped that the thrust of any public information and education (PI&E) campaign would focus on the seriousness of the fuel shortfall and what can be gained through compliance, rather than on the sanctions that will be imposed. As an example, the benefits of reducing motoring costs and reduced number of accidents should be cited. The DSP is well equipped to handle such a public information effort, since the DSP, the Office of Highway Safety (OHS), and the Delaware Department of Transportation (DELDOT) all have components that engage regularly in this activity. In addition, these agencies regularly use a variety of media, such as television, radio, newspapers, billboards, etc., to carry their messages.

5.3 EXEMPTIONS

This measure should be viewed as equitable, since it affects nearly everyone using the roadways in Delaware. Thus, individuals and businesses are treated alike. Those most diversely affected are the people who routinely travel long distances as function of their work, such as salesmen, truck driver, since Delaware and the nation have had considerable exposure to the 55 MPH speed limit law in effect for several years without the granting of any exemptions,

it would be unnecessary and indeed counter-productive to grant any exemptions as a result of an increased enforcement activity.

Advantage: - The law enforcement mechanism is already in place. Accidents will be reduced through lower speed limits.

Disadvantages: - Although the extent of reduction is difficult to predict, various projections indicate that the savings are not great. Considering the system costs necessary to increase speed limit enforcement, including the burden on both law enforcement and the court system to handle the increased citations and prosecution, it is questionable whether the overall effort would be cost effective. The public would likely be discontented with such an approach, unless a very effective public information campaign was instituted. Many would likely feel that more of their individual liberties were being infringed on. Transportation costs could increase to industries involved in cargo hauling (i.e., increased vehicle-miles). Drivers paid on the basis of vehicle-miles rather than hours of operation would be particularly affected. On the positive side, truck mileage figures would improve. Loss of productivity would result for those workers whose work requires large amounts of travel, since longer travel time to and from work sites would detract from regular productive time.

5.3 ESTIMATED ENERGY SAVINGS

Projections of energy savings, whether for the Speed Limit Enforcement Measure or others, are not easily made. One of the reasons for this is the type and quality of data needed to make some of the calculations. Examples of needs include speed limit compliance data, the distribution of vehicle miles of travel (VMT) by road type and travel speed, the reduction in fuel demand resulting from full compliance, etc. A task force of state and local enforcement agencies would be needed to compile this data.

5.4 PRIVATE SECTOR COSTS

5.4.1 IMPACTS ON IMPORTING OF GASOLINE

Highway fuel used in Delaware comes from two refineries (Delaware City, CO and Marcus Hook, PA) or by pipelines pumping finished products to unloading facilities. A more detailed description is contained in the fuel supply Chapter 4 Motor Fuel Supply and Management. Increased compliance with the 55 MPH speed limit could affect the amount of fuel imported in Delaware.

5.4.2 IMPACTS OF THE MEASURE ON THE STATE AND LOCAL ECONOMY

- The Speed Limit Enforcement Measure could result in both positive and negative impacts to the State's overall economy.
- Moving toward targeted energy savings can certainly result in some beneficial changes. Savings cause less demand, and less demand could certainly lower the price at the pump as gasoline stations attempt to sell allocations. This has previous been demonstrated in Delaware. Lower gasoline prices should bring more purchasing power to the consumer, which can obviously be used in a variety of ways. One result might be an increase in sales of new automobiles, especially those that are energy-efficient.

Highway safety effects related to increased 55 MPH compliance are hard to quantify accurately, in that many other interacting variables simultaneously.

5.4.3 SOCIAL IMPACTS

- The Speed Limit Enforcement Measure is generally viewed as being equitable, in that all individuals and businesses are required to comply. However, the measure has a greater effect, both economically and socially, on those who routinely travel long distances in their jobs.
- There is probably some general annoyance associated with longer travel times. For example, more time spent driving means less time for leisure. Nonetheless, opinion polls have indicated public acceptance of the 55 MPH maximum speed limit.

6.0 PARKING AND ALTERNATIVE TRANSPORTATION MANAGEMENT MEASURES

6.1 PURPOSE AND OBJECTIVES

The Parking and Alternate Transportation Management Measure includes an intensified public information and training campaign to induce travelers to shift from low-occupancy vehicles to higher-occupancy vehicles such as car pools, van pools and to mass transit. The activities introduced in this measure are intended to complement the Employer-Based Travel Measure, and would be implemented at an earlier stage of a gasoline shortage. It would be suggested if this measure were implemented, that businesses and employers institute a strategy which involves:

- Increasing the cost of parking through increased rates.
- Replacing subsidized, low-cost or free parking provided by employers to their employees with parking charges at prevailing commercial rates.
- Offering car and van pools reduced rates or preferential treatment.
- Allocating the most conveniently located spaces in employer-provided lots for multiple-occupancy vehicles.
- Reducing availability of on-street parking for local government employees.

6.2 IMPLEMENTATION PROCEDURES

The parking management and transit strategies are supportive efforts to increase the number of people using car and vanpools, implementation of increased parking rates and restrictions would closely parallel the Employer-Based Travel Measure.

6.3 EXEMPTIONS

Because of the difficult task of enforcing employer-based rate increases, parking restrictions, and preferential parking in a large number of small firms, these measures may be considered applicable only to public and private organizations employing 100 or more people at one site, and to government employment locations with more than 50 people. Small firms may use parking facilities jointly; many provide no parking at all.

Several Delaware local governments are served by public transit. In these cities, public transportation is good and parking rates increases for single-occupant vehicles may increase transit rider-ship and car-pooling. Therefore, parking strategies combined with other energy conservation measures (ridesharing programs, transit service improvements) can result in a reduction in vehicle miles traveled greater than the sum of the individual measures.

6.4 STAGES OF IMPLEMENTATION

Preferential parking for car and van pools, provided through prime location or reduced price, reinforces other ridesharing incentives. Therefore, it should continue to be encouraged during the pre-emergency stage where efforts to increase vehicle occupancy are underway. Intensified parking management should be implemented in a Phase II motor fuel shortage. Increased parking rates and restrictions on available parking may result in reduced sales by businesses.

6.5 ADVANTAGES AND DISADVANTAGES

The primary advantage of the Parking and Alternative Transportation Management Measure is in its supportive action for other ridesharing incentives, resulting in increased ridesharing, increased transit rider ship, and gasoline savings in private motor vehicles. Other indirect benefits are modest improvements in traffic congestion, air quality, and traffic safety. Measures to restrict on-street parking can be particularly effective in improving peak-hour vehicle capacity and traffic flow patterns. Parking controls are relatively quick and easy to implement and to dismantle when the need for them diminishes. Their administrative mechanisms already exist and little or no hardware is needed.

However, the Parking and Alternative Transportation Management Measure may have little impact on transportation fuel usage when implemented without complementary car and vanpool programs. Efficient, alternative modes of transportation are needed to gain full benefit from the disincentive to single-occupant vehicle travel which parking controls provide. Another disadvantage may be that the choice of mode of travel to work is insensitive to measures, which make parking more expensive or inconvenient. Therefore, a more severe but long-term strategy of limiting the number of parking spaces may prove necessary.

If parking restraints are severe, vehicle miles of travel (VMT) may be increased by workers riding to work with a family member who then drives home, returning to the work place at the end of the day for the trip home - thus doubling the number of daily round trips - or by an increased use of taxis. This behavior would consume more gasoline and create more air pollution than before.

7.0 EMPLOYER-BASED TRAVEL MEASURES

7.1 DESCRIPTION

7.1.1 PURPOSE AND OBJECTIVES

Potentially one of the most fruitful and desirable ways of reducing gas demand is by increasing average vehicle occupancy rates. In that way more travel (in terms of person-miles) can be

accomplished with fewer vehicle-miles and therefore less fuel consumption. The appeal of this approach is in its great demand reduction potential, and its relatively painless nature.

The great demand reduction potential of this approach derives from the fact that current auto occupancy rates are very low (overall nationwide they are 1.7 persons per vehicle trip). These rates are particularly low for travel to work (average occupancy of 1.2 per auto), which is precisely when and where the physical and economic opportunities for ridesharing and alternative transportation are the greatest. Furthermore, commuter travel represents a very significant proportion of all gas consumption (estimated at over 30 percent of the total). By focusing on increasing the average vehicle occupancy of the work trip, therefore, it should be possible to obtain significant reductions in gasoline demand. The relatively painless nature of increased vehicle occupancy is its second favorable feature. Increased vehicle occupancy does involve significant changes in travel behavior because it calls for a change in the mode of some travel from single-occupant auto to shared-ride, public transit or Para-transit modes. However, this change in travel behavior involves minimal, if any, loss in mobility since travel itself (person trips) need not be reduced. It is this maintenance of mobility, with all the personal, social and economic benefits it entails, that makes increasing vehicle occupancy such an attractive demand reduction approach. This is not to say that there are not obstacles involved in changing occupancy rates, for any travel behavior change is difficult to achieve, especially on a permanent basis.

The Employer-Based Travel Measure would involve state and local government officials working with companies that employ large numbers of workers at individual sites in the state, with the objective of increasing vehicle occupancy rates and/or cases on the job as well. Employer-based plans could involve local transportation planners working formally with selected large employers.

7.1.2 IMPLEMENTATION PROCEDURES

The Employer-Based Travel Measure allows for a great deal of flexibility to affected employers. The measure's flexibility makes it a good candidate for implementation at any or all stages of fuel shortfall. Several Delaware local governments are operating a number of programs that would fall under the category of Employer-Based Travel Measures. These programs are being conducted on a voluntary basis in a non-shortage situation. These efforts should be continued and promoted. Other efforts to increase vehicle occupancy through employer-based actions on a voluntary basis should be encouraged by the city at this time. As the severity of the motor fuel shortage increases, the continued encouragement of the voluntary efforts will intensify. The general procedures for this measure are as follows:

Affected Organizations and Individuals: The Employer-Based Measure will apply to all employers operating with 100 or more persons employed at one site. Also subject to the measure will be all schools at post-secondary level (colleges, universities, and technical schools) with a total commuting student-faculty-staff population of 100 or more persons.

State, county, and municipal organizations may also be encouraged to participate in the plan, at all sites where 50 or more persons are employed. For this purpose, "employer" will be defined as any level of government (i.e., state or local) rather than the particular agency. Employees of one government level will be counted with the group with which they are listed for payroll purposes, even though they may be supported with grant funds from a higher government level. In addition, all smaller employers, private and public, will be requested to comply voluntarily with the measure to the maximum extent possible.

Plan Requirements: If mandatory requirements become necessary, employers who are subject to the plan will be required to develop for each applicable work site a program to reduce work-related travel by employees. In a severe shortage (Phase III), the local government officials may require employers affected by the measure to implement strategies according to the following formula:

- Large employers (300 or more employees at one site) would have to select a total of four strategies: either one strategy from Category I and three strategies from Category II; or, two from Category I and two from Category II.
- Mid-size employers (100 to 300 employees at one site, 50 to 300 for government employers) would have to select a total of 3 strategies: one from Category I, and two from Category II.
- Employers will be credited with travel reduction actions which they have undertaken prior to implementation of the measure and which meet the requirements of the measure (e.g., an employer who already operates a car pool program will not be required to institute another Category I action).
- With increasing severity of shortfall, the Delaware Energy Response Team may add to the mandatory requirements of the measure and may require affected employers to reduce employee travel to target level at which not more than 50 percent of all employees at the work site commute alone. Employers would be required to implement as many strategies from Table G.1 as are necessary for them to achieve the target level. Also, when the shortage is severe (Phase III), affected employers will be required to:
- Designate and publicize an "internal transit/paratransit coordinator," in charge of establishing a central source of information on transit and paratransit services available to employees.

Use internal communications media (e.g., newsletters and other house organs) as a tool to keep employees informed of the employer's efforts in providing or promoting alternative travel means, and to assist in the organization of car pools, van pools, charter buses, and the like. Employer-based travel actions must be developed and implemented within 30 days of a decision by the Governor to implement the plan. Employer efforts must be sustained for the duration of the emergency. No formal reporting requirements will be included in the Employer-Based Travel Measure. Instead, employer compliance with the measure may be monitored through voluntary web-surveys.

7.2 EXEMPTIONS

Exemptions may be granted to employers who can demonstrate to the Delaware Energy Response Team that complying with the requirement as stated would generate significant hardship for their employees, or would severely impair their firm's ability to do business, over and the effects of the fuel shortfall itself. In preparing request for exemption, specific reference must be made to each of the strategies listed in Figure D.6, and reasons for rejecting each strategy deemed unacceptable must be advanced. Qualifying employers will in most cases be granted only partial exemptions; i.e., allowances with respect to a reduced number of required actions, rather than blanket exemptions from all the measure's provisions. If exemptions are granted, employers will be expected to demonstrate good faith in complying, as far as is reasonably possible, with these actions which are judged to be feasible.

Exemptions may also be granted to employers able to demonstrate to the satisfaction of the Delaware Energy Response Team that 60 percent of employees at an otherwise eligible site already commute by transit, pooling arrangement, and other energy-efficient modes. In this context, fuel-efficient modes are defined as: car pools, van pools, transit and paratransit services of all kinds, and human-powered modes (e.g., walking, cycling).

7.3 STAGES OF IMPLEMENTATION

The Employer-Based Travel Measure can be implemented to varying degrees of a motor fuel shortage. In the guarded phase of motor fuel shortage, voluntary ridesharing and parking management programs should be continued and promoted. In the early stages of a shortage (Phase II), the Delaware Energy Response Team should take the lead in the institution of appropriate employer-based travel actions as outlined in this measure.

As the fuel shortage situation worsens, city government may implement the mandatory forms of the measure. The Employer-Based Travel Measure allows enough flexibility so that the mandatory requirements can be molded to fit the severity of the crisis. Recommended examples of mandatory requirements were listed in sections above. Mandatory employer-based conservation actions should be implemented no sooner than in Phase II (moderate shortage).

7.4 ADVANTAGES AND DISADVANTAGES

It is estimated that travel to from work accounts for over 30 percent of personal vehicular travel in the U.S. More significantly, although business trips represent a trip purpose which is very amenable to various forms of ridesharing, national average auto occupancy statistics show the lowest value for the work trips, 1.2 persons per vehicle, compared with 1.6 for shopping trips and 2.1 for social-recreational trips. Thus, increasing ridesharing will reduce demand without having a disruptive impact on the economy.

By focusing on work-related travel, the measure allows other kinds of travel to continue, thereby helping to maintain tourism, recreation, retail activities, and other key elements of the city's economy during a shortage. This represents a major economic benefit, which is the most important result of the Employer-Based Travel Measure. It does not impose direct costs, in the form of a loss, ultimately on consumers, as do measures, which mandate restrictions on individual travel. Largely because of this, the benefit-cost calculations performed for this sure show it to be among the most cost-effective of all the conservation measures considered.

Another advantage offered by this measure is the flexibility allowed, not only to the state, but also to the affected employers and ultimately to the commuters. The state has flexibility in implementing the measure either voluntarily or with various degrees of mandatory requirements. The employers have the opportunity to choose from a list of alternatives and mold a plan to fit their needs and capabilities. The commuters retain the ability to decide what mode of travel they will use to get to work in the event of a motor fuel shortfall. The plan also has an important symbolic value, and may stimulate long-term conservation behavior.

The Employer-Based Travel Measure can be implemented quickly depending on the scope and complexity of the measure an amount of preplanning and preparation done. A period of at least four to six weeks would be required to get services operating to a point where results would be significant.

The Employer-Based Travel Measure represents an equitable means of enlisting the support and cooperation of those employers most in need of, and most capable of supporting, auxiliary transportation in an emergency. The large employers singled out by the measure may find voluntary implementation of the measure advantage to their firms. Ridesharing efforts may reduce a potential loss of productivity that could result when employees are unable to get to work in motor fuel shortage.

7.5 IMPLEMENTATION

Flextime: Many companies have experimented with flexible-work-hour schedules in the past. Usually, the programs have been well received. The advantages are as follows:

- Ease of application and acceptance by workers
- More even peak-hour traffic flows, stimulating gasoline savings
- Support for the measure from organized labor, unless the stagger is imposed.
- Increase in productivity because many workers choose to work during hours they are more alert.

A major disadvantage is that decreased auto-highway congestion may make driving a more attractive alternative to more fuel-efficient modes.

Compressed Workweek: The imposed compressed workweek by government of any measures drastically affecting the daily living patterns of the citizenry is inherently controversial. The compressed workweek would alter the daily routine of most of the population. Therefore, its impact in social terms is extensive. The advantages of a compressed workweek include the following:

- Rapid payoff in gasoline savings by reduced trips
- Increased employee morale (already found in places where such measures have been experimented with).
- Easing of commuting problems.
- Increased time to devote to home-related activities.
- Possible decreases in heating and lighting, but also possibly offset by an equal increase in home use.
- Disadvantages include the following considerations:
 - Because the 5-day week is deeply ingrained, the adjustment process can be expected to be difficult, particularly if the changes are mandated.
 - Early experiments have indicated that the compressed workweek increases scheduling and communications difficulties and makes managers' work more difficult; these have been some of the reasons why some firms have dropped the idea.
 - Productivity may decline due to increased fatigue, and industrial accidents may be expected to increase for the same reason.
 - Changing work pattern may entail setup costs.

- The Compressed Work Week Measure could cause loss of income to some or all employees of the organizations due to closing were not made up in the balance of the week.
- A compressed or week initially may be disruptive to families. Coordinating the activities of various family members may prove difficult. Once adjustments are made, however, the additional day of leisure may benefit many families. A uniform closing day should minimize the disruption to families with children or working spouses.
- If a compressed workweek is promoted on a voluntary basis when supplies of motor fuel are less scarce, additional personal travel may result. However, under conditions calling for mandatory compressed workweek, motor fuel for such personal travel would be less available.
- This measure will be extremely difficult to enforce.

7.6 ACCEPTABILITY

Public acceptance of a government program may not be assumed. In fact it can be argued that a population faced with a serious crisis would prefer rather drastic corrective measures, even if the measures involved significant and immediate sacrifices or inconveniences, as long as it is convinced the measures will work. Public acceptance of the Compressed Workweek Measure as an emergency measure in the event of a national energy emergency could depend upon:

- The ability of the state to provide adequate and convincing information to the public.
- The absence of conflicting information.
- The public's trust in the government information and in the government efforts to ensure the effects of the program would be as equitable as possible.
- Organized labor generally does not support the 4-day, 40-hour workweek, but supports the 4-day, 32-hour week as long as there would be accompanying reduction in productivity.
- Employers are least enthusiastic about alternative work schedules for fear of a decline in productivity and a rise in overhead costs. Thus, for the measure to succeed on a voluntary basis would require that substantial tax benefits or other economic incentives be offered. However, since the measure will not be implemented under normal conditions, reactions of employers could be considerably different than expected.

7.7 ESTIMATED ENERGY SAVINGS

The estimated energy savings will require monitoring of the measure.

8.0 PRIVATE SECTOR COSTS

It is difficult to separate the effects of a compressed workweek from the corresponding economic developments likely to arise from the fuel shortage emergency itself. Employment may even increase slightly if a decrease in productivity results from the energy shortage and additional workers are needed to maintain output levels. It is unlikely that the retail sector will experience a decrease in demand. A study done on the effects of "blue Laws" on aggregate retail sales has shown the total weekly retail companies are not affected by Sunday closings.

These results suggest that where patterns of consumption will change, overall demand will not decrease. An exception to this may be restaurants located in the downtown areas, where shortened lunch breaks and an additional day off for employees may decrease business in establishments catering to lunchtime traffic. Costs to employees such measure might be as follows:

- Costs in child care arrangements for those exempt from the compressed workweek
- Costs to workers who normally receive over-time or additional pay for working night shifts.
- Costs to individuals whose income depends on second jobs that would be reduced because of longer working hours.
- It has been suggested that productivity may decline when the workday is lengthened resulting substantial costs employers. There may also be costs associated with the rescheduling of employees and materials. Although employers may incur costs in rescheduling their operations, these costs may be offset by increased employee morale resulting in reduced absenteeism and reduced turnover rates among their employees.

8.1 LOCAL GOVERNMENT RESPONSIBILITIES

8.1.1 IMPLEMENTATION

The Delaware Energy Response Team will be the primary agency responsible for administering all actions within this measure and will act as coordinator of all activities associated with its implementation.

In addition, each agency/company covered by the measure will be responsible for setting up a plan for day-to-day implementation of a compressed workweek, as well as coordination with other area employers and area transit authorities to promote flexible work hours.

Phase III Fuel Shortage: Because of the legal issues involved, the potentially disruptive social and economic effects, and the need for careful consideration of equity issues, the planning phase of this measure is of the utmost necessity. In the event of a Phase III Fuel Shortage, additional planning effort is needed in the planning of this. New local and/or state legislation may be required.

Major legal concerns are laws and labor contracts requiring overtime pay for hours worked beyond specific daily maximums. State and/or local laws/ordinances concerning days of the week businesses may operate also must be examined. The fuel management coordinator specific duties during Phase II of a fuel shortage may include:

- Prepare a list of companies that are included in an exempt from the measure.
- Compile a list of area transit authorities to be distributed during Phase II of the fuel emergency, to promote coordination between employers and area transit authorities in scheduling flextime hours for employees.
- Work closely with city and state department directors to classify government services into nonessential, essential and critical, to provide the basis for implementation of a city employee compressed workweek.

- Begin employer workshops to better define the measure and what may be required of employers. Workshops in Phase II should emphasize coordination of employers and transit authorities to set up flextime schedules.
- Develop a specific plan for implementation of mandatory compressed workweek with more detailed guidelines.
- Conduct surveys that will assist the city in a Phase III fuel emergency to collect data to be used in analyzing the measure.
- Determine more precisely the potential energy savings from a compressed workweek.

Phase II Fuel Shortage: At a Phase II level of emergency the Delaware Energy Response Team will continue with activities unfinished in Stage I as well as:

- Intensify efforts to convince employers of the benefits of staggered work hours and voluntary implementation of a compressed workweek. (Implementing the employer workshops organized in Phase II will do this.)
- Inform the city and concerning informational requirements, the appeal procedure and reporting.

Phase III - Fuel Management Coordinator Duties:

- Respond to questions from employers in their area.
- Explain the measure and appeal procedure to individuals in their area.
- Begin organizing recruitment of city personnel and procedures for training city personnel.

Phase IV Severe Shortage: At a Phase IV-Severe Shortage the city fuel coordinator will continue unfinished duties from Phase I and Phase II well as:

- Oversee the implementation of a mandatory compressed workweek.
- Handle problems and questions
- Handle exemptions and appeals.
- Assist in the exemption and appeals process.
- Provide necessary reports
- Instruct employers on methods of gathering data on the effects of the measure, and provide additional reports to employers on experiences with the measure.
- Answer questions as they arise.

8.1.2 DATA COLLECTION AND ANALYSIS REQUIRED FOR EVALUATION

In order to evaluate the effects of the measure, it may be necessary to obtain further cooperation from the affected employer employees. It is hoped that flextime hours will reduce gasoline demand by stimulating greater use of mass transit and reducing peak-hour traffic congestion. To obtain data analyzing the effects of this measure, it may be necessary to survey employees on changes in their habits of getting to and from work and changes in their consumption of motor fuel.

It is hoped that a compressed workweek will decrease miles traveled weekly to work. It has been suggested that the additional free day will actually increase miles traveled. Therefore,

employees may be surveyed not only on changes in their work miles traveled, but also on what was done in their free time. In addition, if employers express concern that a compressed workweek will decrease productivity and incur additional operation costs it must be considered. Therefore, employers also need to supply survey information. To carry out data collection, the city may surveys to be distributed to employers in the area. Employers could furnish the surveys to their employees. The fuel management coordinator may compile reports analyzing the data received. Although these methods will require further effort on the part of the employer, they are essential so the city can assess fairly the impacts and costs of implementing the measure. These efforts will also help in future fuel management planning.

9.0 SCHOOL SYSTEM CONSERVATION MEASURE

9.1 DESCRIPTION

9.1.1 PURPOSE AND OBJECTIVES

The purpose of the School System Conservation Measure is to reduce the consumption of gasoline by reducing the number of trips made to and from school and/or by better planning school activities and transportation services. It also encourages students to ride to school only in car pools or other ridesharing modes of three persons or more.

9.1.2 GENERAL PROCEDURES AND STATUS OF CURRENT PROGRAMS

A variety of modifications can be made in school schedules and activities depending on the extent of the motor fuel (diesel and gasoline) shortage. Today, most school districts are continuously assessing methods of reducing fuel costs. This appendix is designed as a way to promote conservation activities in schools.

Transportation

- Training bus drivers in energy-efficient driving techniques.
- Replacing fuel tank caps on school buses with locking caps. Optimizing school bus scheduling and routing for fuel savings.
- Discouraging students driving cars to school unless they are needed for vocational activities.

Reducing Fuel Use for Special Events

- Measures to reduce fuel use by athletic officials include using the most efficient size vehicles for trips, conducting local school fuel saving clinics, promotion of car pooling among officials to local association meetings, assignment of officials from same area so that they can ride together and determining better meeting locations.
- Rescheduling of athletic events to reduce fuel used, including examining the possibility of reinstating the activity period and athletic practice during the school day. This would involve changing current athletic regulations restricting interscholastic school practices to after-school hours.
- Stress energy education in the schools.

- In addition, this plan suggests the schools consider rescheduling of all after-school activities, not only athletic events.
- More drastic schedule changes, i.e. the four-day school week; will be implemented only in a severe energy emergency and in conjunction with the compressed workweek. Education hours lost on the fifth day will be spread equally over the four days (with provisions made for additional exercise breaks during the school year), or, if it appears fuel shortages will be temporary, school schedules may be modified so that during the shortage, schools will operate an eight hour/four-day week, with lost time being made up during vacation periods.

9.1.3 STAGES OF IMPLEMENTATION

Local schools are encouraged to continue energy conservation planning. During a mild shortage (Phase II), at the discretion of the schools, many of the above suggestions will undoubtedly be implemented. During a severe shortage (Phase III), pupils will be restricted from traveling to school in their own cars unless they can present reasons to the principal for doing so. Also, a compressed school week will be implemented, subject to the condition of prior or simultaneous implementation of a compressed workweek.

9.1.4 ADVANTAGES AND DISADVANTAGES

The advantages of the School System Conservation Measure include the following:

- There would be a rapid payoff in terms of reduced consumption of fuel for school buses and transportation for school personnel.
- The measure is easy to implement and enforce.
- The disadvantages of the school schedule modification aspect of the measure include the following:
 - Modification of school schedules could adversely affect learning. Longer school days could fatigue students and teachers, decreasing amount learned and increasing discipline problems.

Curriculum Changes

- Schools provide many services, such as meals for children from low-income families and training for handicapped children, which might be reduced by schedule modification.
- The economic impact on parents exempt from compressed workweek could be adverse. This includes lost work time and/or cost of childcare for working parents.
- Some high school students who work after school may have to give up their jobs if a longer school day was mandatory.
- Undoubtedly, most high school students who drive will protest not being allowed to drive their own vehicles to school.
- A longer school day in winter might necessitate some students leaving for and/or returning from school in the dark.
- Extracurricular activities would be disrupted by implementation of any of the variations of the measure. The impact of this loss needs to be evaluated.

- Restrictions on students driving to school may increase busloads to the extent that additional buses will have to be operated.
- The plan considers only fuel savings. Overall savings are uncertain and will depend on what students do with their free time.

9.1.5 ESTIMATED ENERGY SAVINGS

The implementation of current suggestions could possibly reduce fuel consumption by 20 percent. The schools are encouraged to collect data and supply accurate estimate savings as they occur.

Shortening the school week and making up lost days during scheduled vacation periods would not achieve energy savings on a long-term basis. This measure could be used during a short-term energy emergency to shift energy consumption to a later period of the same school year. Gasoline consumption for students and employee travel during the reduced school week period would follow the pattern described below. National estimates have been made of savings of 37,000 bbl/day of gasoline by closing the schools one day per week.

9.1.6 PRIVATE SECTOR COSTS

In assessing the private sector costs of a four-day school week and/or curtailment of after school activities, it is important to keep in mind that these measures will be implemented only in the event of a severe (Phase III) energy emergency and in conjunction with the compressed workweek. Therefore, private sector costs for a compressed school week will be less than might be expected.

The students will bear costs in the following ways: - Students may learn less because the school day is lengthened. This may also result in fatigue, especially among younger children. Going to school longer hours may result in students having to give up after school jobs. The impact on students from curtailing after-school activities will require more detail. Because the measure will be implemented with the compressed workweek, families should not be subject to severe adjustments. An exception will be those families whose members are exempt from the compressed workweek measures.

APPENDIX D – FUEL EMERGENCY RESPONSE PLAN

1.0 INTRODUCTION – DELAWARE EMERGENCY FUEL RESPONSE PLAN

Fundamentally, a fuel disruption is the result from an imbalance between the amount of fuel available and the demand for that fuel at the prevailing price. It may be the result of either 1) a rapid drop in fuel supply due to international disturbances, natural disasters, refining or pipeline problems, terrorist activity, or even labor disputes; or, 2) a sudden increase in demand caused by, for example, unseasonable weather conditions. The disturbance can be a short-term occurrence caused by transitory events, or, it can be of longer term, demanding changes in fuel use priorities.

The increase in the price of fuel, that usually accompanies a disruption, tends to establish new supply/demand equilibrium at the higher price. History has demonstrated that people adjust their behavior and reduce fuel consumption during fuel shortages, whether because of price increases or the difficulty and inconvenience of obtaining fuel. Thus, a fuel shortage is essentially a transition from one stable state to another.

While the fundamental objective of this document is to provide specific authority and procedures to appropriate personnel during the time of a fuel disruption in order to protect the interests and safety of Delaware citizens, a corollary purpose is to make the transition to a stable market as quickly as possible and to eliminate additional emergencies that could occur during the transition.

The document is designed to work in conjunction with the State of Delaware Emergency Response and Recovery Plan, as developed and implemented by the Delaware Emergency Management Agency (DEMA).

In summary, the objectives of this document **are** these:

- To provide a quick, unified and consistent statewide response to each fuel disruption and Emergency Classification Level (ECL) listed herein.
- To provide specific authority and procedures, to appropriate personnel, to accomplish the abovementioned objective, in order to protect the interests and safety of Delaware citizens.
- To provide direction and assistance to the Delaware Energy Office during any fuel disruption and ECL.
- To provide direction and assistance to the Delaware Emergency Management Agency (DEMA) during any fuel disruption and ECL.
- To foster clear communication relating to fuel disruptions between state and local government, industry, and citizens in advance of and/or during a fuel disruption.
- To encourage and facilitate changes in travel patterns and conservation of resources prior to, during, or as a result of a fuel disruption.
- To minimize adverse impacts on public health, safety, mobility, commerce, and the State's economy.

2.0 LEGAL AUTHORITY AND REFERENCES

¹U.S. Department of Energy (DOE) and Title 20, Delaware Code, Chapter 31, 3101, 3102, 3107, and 3115

The State EOP is designed to address the response to the consequences of any disaster or emergency situation that would affect the population and/or property within Delaware. The State EOP is applicable to natural disasters, such as floods, earthquakes, and tornadoes; man-made incidents, such as civil disturbances; and technological situations, such as hazardous materials (to include terrorism, power failures, nuclear power plant incidents, and national security emergencies). The State EOP describes the basic mechanisms and structures by which the State of Delaware would respond to potential and/or actual emergency situations. To facilitate an emergency response, the State EOP contains Emergency Support Functions¹ (ESFs) designed to implement and sustain a functional approach to emergency response and assistance (see Chapter 1 - Figure 1.1). ESF-11 is assigned for a Public Service energy emergency response (see Chapter 1 - Figure 1).

3.0 MANAGEMENT SYSTEM

Information and Communication Structure:

The Delaware Energy Office's (DEO) staff shall monitor energy related issues and maintain communication with the petroleum industry, other state agencies, the Motor Fuel Working Group, the Delaware Energy Office, Delaware Emergency Management Agency (DEMA) and the federal Department of Energy (DOE), on an ongoing basis, in order to, as practicable, anticipate a fuel disruption of any magnitude.

The DEO staff may be the first to know of a given disruption or potential disruption, he or she will determine and designate the initial **Emergency Classification Level (ECL)** of a given disruption.

All events, or ECLs, will be communicated by the DEO to the following persons: the Delaware State Energy Coordinator, the SEOC (if applicable), and the Delaware Energy Office. Also members of the State's Motor Fuel Working Group will be alerted.

- **Level I Readiness** SHALL be communicated to the persons listed above; however, they SHALL NOT be communicated with the media so as not to unnecessarily cause alarm to the public.
- **Level II Incident (Minor Disruptions)** will be communicated to those persons listed above. If media notification is warranted all communications will be coordinated through the Delaware Energy Office.
- **Level III Alert (Moderate Disruption)** will be communicated to those persons listed above all media contacts will be coordinated by the Delaware Energy Office.
- **Level IV Emergency (Major Disruption)** - During the Emergency Phase, the DEMA, as provided within the State of Delaware Emergency Response and

¹ State Emergency Functions (SEFs)

Recovery Plan, is the lead agency, and the DEO and Motor Fuel Working Group will act as support during the course of the declared emergency.

4.0 COMMUNICATION PROCEDURES:

A. Internal (calling protocol)

1. Pipeline Disruptions or Potential Pipeline Disruptions

- a. Pipeline companies contacts the DEO, DEMA, PSC, and local emergency management.
- b. The DEMA Duty officer contacts the Delaware Energy Office and DEO (Upon receiving a voice mail message from the duty officer you must immediately return the duty officer's call to confirm receipt of the message)
- c. The DEO and DEMA coordinate with the Delaware Energy Office regarding the issue at hand.
- d. Each agency contact is responsible for internal notifications for their respective agencies
- e. If industry notification comes to a team member outside of the 24-hour duty officer the team member will alert the Delaware Energy Office and the DEO.

2. Other Motor Fuel Emergencies

- a. Industry or city and state agencies notify the DEO.
- b. DEO confers with Delaware Energy Office.
- c. Each agency contact is responsible for internal notifications for their respective agencies including the agency director and other executive staff.
- d. If notification of an incident comes to a team member other than the Delaware Energy Office or DEO, the team member will alert the Delaware Energy Office and the DEO.

B. External Communications

1. Audiences

A. industry

1. refiners
2. pipeline operators
3. retailers
4. jobbers
5. industry associations
6. warehouse-storage
7. railroad transporters
8. transporters
9. truck drivers

- 10. suppliers
- b. non-industry stakeholders
 - 1. driver associations/organizations
 - 2. public transportation providers
 - 3. large employers
- c. media
- d. general public
- e. governmental entities
 - 1. Municipalities
 - 2. Counties
 - 3. Neighboring states energy contacts.
 - 4. Federal entities
 - A. U.S. Department of Energy
 - B. U.S. Environmental Protection Agency
 - c. U. S. Department of Transportation – Office of Pipeline Safety

(Message/Communication to external audiences range from normal demand and conservation (Level I and II) to encourage public transportation and demand extreme conservation (Level III and IV).

Definitions:

"Emergency"- A sudden, urgent, usually unforeseen occurrence or occasion requiring immediate action.

Level I: Readiness encompasses the ongoing activities of the DEO staff under normal operating conditions. The staff routinely monitors Delaware regional, national and world events that have the potential to cause an energy supply disruption.

Level II: Incident a *minor disruption* caused by an existing condition that results in a realized shortage or disruption in fuel supply that may last up to **one or two days**.

Level III: Alert a *moderate disruption*, either localized or statewide, resulting in an obvious shortage of fuel that may last up to **three days**.

Level IV: Emergency a *major disruption* either localized or statewide, resulting in the need for immediate local law enforcement and initiations of public fuel conservation. Initiated if the disruption is anticipated to be **greater than three days** in length.

"State of Emergency"- Means the duly proclaimed existence of disaster or of extreme peril to the safety of persons or property within the State caused by air pollution, fire, flood or flood-water, storm, epidemic, riot, earthquake, or other causes, except those resulting in a state of war emergency, which are or are likely to be beyond the control of the services, personnel, equipment and facilities of any single county, city or town, and which require the combined efforts of the State and the political subdivision.

5.0 CONSERVATION STRATEGIES

Public Awareness:

- Fuel Conservation:
- Alternative Fuels:
- Alternative and Public Transportation:
- Ridesharing Programs:
- Speed Limit Enforcement
- The Delaware Emergency Management Agency (DEMA) will institute a stepped-up program to enforce the posted highway, and roadway speed limits. The DEO may carry out a public awareness program in order to promote compliance with posted speed limits and their effect on fuel economy.

Printed Educational Material:

- Drive-Wise material for consumers
- Emergency measures for retail service station owners and operators (see E.5)

6.0 VOLUNTARY CONTINGENCY MEASURES FOR INDUSTRY

Drive-Up Window Closures: - The Governor may ask for voluntary restriction on operations of drive-up windows at banks, liquor stores, fast food and similar establishments. Exceptions may be made at facilities where only drive-up service is provided.

Maximum Motor Fuel Purchase Requirements: - No sale of motor fuel, during a single dispensing transaction, shall be made that is in excess of 25 gallons (or 95 Liters), per vehicle tank.

Maximum Purchase for Separate Containers: - Not more than two (2) gallons (or eight [8] Liters) of motor fuel shall be sold or purchased for delivery into a separate "safety approved" container, concurrent with the filling of a fuel tank of a vehicle, during a single dispensing transaction. This restriction shall not apply to containers to be used for a commercial purpose, such as for fueling commercial landscaping or construction equipment, electrical generators, etc.

Minimum Motor Fuel Purchase Requirements: - A specific minimum dollar, or volume, amount of motor fuel purchased at a retail service station, shall apply to a single vehicle, during a single transaction.

When the minimum amount specified, (by the Governor), is a whole dollar amount (e.g., \$5), it shall include all applicable taxes.

If a vehicle's tank cannot hold the entire amount of fuel covered by the minimum dollar amount or volume, the retailer may collect the total amount of the required minimum sale,

Signs clearly detailing the minimum purchase requirement shall be displayed on each motor fuel dispenser at every retail service station, or otherwise communicated to consumers,

Odd-Even Motor Fuel Sales Restrictions: - At the retail level, motor fuel shall not be dispensed into any vehicle on an "odd-numbered day" of the month (1st, 3rd, 5th, 7th, 9th, etc.) unless the last "numerical digit" on the vehicle license plate of that vehicle is an "odd number" (1, 3, 5, 7, 9).

At the retail level, motor fuel shall not be dispensed into any vehicle on an "even-numbered day" of the month (2nd, 4th, 6th, 8th, etc.) unless the last numerical digit on the vehicle license plate of the vehicle is an "even number" (0, 2, 4, 6, 8).

The number "zero"; as identified above, will be considered an "even-number" for the purpose of the odd-even motor fuel sales restrictions.

In the event that there are no numerical digits, but only letters (e.g., as in some vanity plates), the license plate shall be considered "even" and, motor fuel shall be dispensed into that vehicle on "even-numbered days" of the month.

In the event that there are no license plates attached to a motor vehicle, (egg. as in newly purchased vehicles), the vehicle shall be considered "odd". And, motor fuel shall be dispensed into the vehicle on "odd-numbered days" of the month.

For any calendar month consisting of an "odd number of days" (31, or 29 for February in leap years), fuels sales made on the last day of that month will not be subject to the "odd-even" restrictions, and motor fuel may be dispensed, on that day, without regard to the license plate numbering.

Motor fuel purchases made at self-service Motor Fuel stations, whether payment is made by insertion of a card into a card-reading mechanism, by the use of coin-operated pumps, or by payment to a cashier, shall be governed by the same odd-even rules.

During a declared emergency situation, an attendant shall be present to verify the odd or even license plate number and compliance with these rules as applicable,

Motor fuel retailers shall not require the purchase of special goods or services such as car washes, tires, lubrication, or other goods and services, as a condition to the purchase of motor fuel. In addition, retailers shall not dispense motor fuel on a preferential basis such as by appointment or to preferred customers, friends, or relatives,

Prohibited Hours of Sale: - The dispensing of motor fuel by retailers may be prohibited during certain hours of operation in urban or congested areas in order to prevent congestion during peak hour traffic. For example, retailers may voluntarily agree to restrict dispensing of motor fuel may "between the hours of 7:00 a.m. and 9:00 Am., and from 4:00 pomp and 6:00p.m., Monday through Friday". This restriction may be implemented by city, by county, or statewide.

Retail Service Station Fuel Reserve Plan: - The main objective of the Retail Service Station Fuel Reserve Plan is to secure specific retail service stations for the exclusive use of emergency, fire department, law enforcement, and military vehicles. The DEO and the Motor Fuel Working Group will work with industry to identify potential service stations for participation that are strategically located statewide for this purpose and have agreed to voluntarily display a yellow flag, upon notification by the DEO, during times of fuel emergencies, as declared by the Governor.

Uniform Flag System for Motor Fuel Sales: - Motor fuel retailers shall indicate the availability of fuel supply at their facility by the display of a colored flag that is at least 20" in width and 20" in length, flown in such a manner as to be visible to the public from off of the premises. The flags shall bare the following colors for the Stated applicable situations:

1. **GREEN FLAG:** Means that motor fuel is available for sale to the general public.
2. **RED FLAG:** Means that motor fuel- IS NOT available and/or that the station is closed or open *only* for auto servicing; and
3. **YELLOW FLAG:** Means that the service station is open for dispensing motor fuel to only clearly marked emergency, fire department, law enforcement and military vehicles, but that the service station is open for auto servicing,

If a retailer is out of a specific grade of motor fuel, but is otherwise dispensing other grades of motor fuel, the retailer shall attempt to the best of his or her ability to indicate, by means of signs, which grades are available.

7.0 EMERGENCY CLASSIFICATION LEVELS:

During a motor fuel shortage², the activities prescribed in each Emergency Classification Level (ECL) intensify depending on the severity of the shortage. **The point of transition from one phase to the next is not an absolute.** To a large degree, it is qualitative; the implementation of each level is a DEO policy decision, recognizing public perception of the seriousness of a given event or emergency.

Level I - "Readiness"

Description: - A "Level I-Readiness response is initiated in response to an event that *has the potential to impact the supply of fuel, and could develop into a higher ECL.* This is only an ALERT and should only be elevated to a higher ECL as warranted,

Communication and Response: The DEO will maintain close communication with local refinery staff to determine the severity of the closure and to better judge the length of time that the pipeline will be kept out of service. If it is determined, with confidence, that the pipeline will be repaired and returned to service within 24 hours, there will be no need to elevate to a higher ECL. The Level I event will be determined by the DEO and communicated to the Delaware Energy Coordinator, the Delaware Energy Office, Motor Fuel Working Group members and the DEMA, but no media communication will be made.

If the DEO determines, with confidence, that the pipeline will be out of service for an undetermined time, perhaps greater than 24 hours, a Level II or higher ECL will be initiated, as applicable, and communicated to those listed above.

Measures to be implemented: None.

Level II – "Incident"

Description: A *Level II-Incident (a minor disruption in fuel supply)* response may be characterized by a potential (advanced knowledge) or a realized (occurring) event that may have, or is having, an impact upon supply of fuel to or at retail service stations. Regardless of the cause, the disruption is, or will, limit the transport of product to or from retail service stations temporarily.

² For planning purposes, a "shortage" means an actual or potential loss of supply, which significantly affects the State's energy systems, and caused by a mechanical failure, natural cause, or Geopolitical events such as war, terrorism, civil disturbance or embargo.

Communication and Response: The DEO will maintain close communication with the local Delaware refinery, terminal managers, and fuel dealers in order to better understand the impact that the aforementioned *events* will *have on the Delaware* marketplace.

*Based on the characteristics of the definition of the “minor disruption” above, the DEO shall initiate a **Level II ECL**. If and when it is determined, with confidence, that the pipeline has been returned to service, and that other refineries are diverting product to Delaware there will be no need to elevate to a higher ECL.*

The Level II Incident marks the activation of a more formal communication network with the Delaware Energy Office, DEMA, other state agencies, industry, and the U.S. Department of Energy, as appropriate. DEO Staff will determine the nature, potential extent and duration of a perceived or impending fuel shortage. The Level II ECL will be communicated immediately to the Delaware Energy Coordinator, the Delaware Energy Office, Motor Fuel Working Group members and the DEMA.

The Delaware Division of Weights and Measures coordination with the DEO staff may seek data and information from industry regarding fuel supply including contacting motor fuel industry stakeholders to assist in assessing the severity of the situation. The DEO staff in consultation with DEMA staff will attempt to assess the potential impacts of an anticipated petroleum shortage on supply, and recommend further action to the Delaware Energy Office. If the Delaware Energy Coordinator, in consultation with the Motor Fuel Working Group, determines the existence of a protracted energy problem, he or she may recommend transition to Level III.

In addition, if requested, a news release statement outlining the details of the situation, with a request for the public's attention to suggested contingency measures, may be released by the Delaware Energy Office.

Measures to be implemented:

Recommendations Only:

Public:

- Clearly and firmly relay to the public that there is currently no need to panic.
- Encourage fuel conservation.
- Encourage ridesharing for the coming week.

LEVEL III - "ALERT"

Description:

The Level III Alert response (a moderate *disruption* in fuel supply) may be characterized by a potential (advanced knowledge) or a realized (occurring) impact on supply to or from retail service stations that may be expected to persist for up to **three days**.

Regardless of the cause, the disruption may be characterized by limited transport of product to retail outlets, lack of product at retail outlets, and possibly the formation of "gas lines" at retail outlets as a result of public reaction to a perceived potential shortage. Depending upon the severity of the situation, a Level III ECL may quickly escalate into a Level IV ECL and could result in conditions that threaten public health and safety, and which would involve immediate coordinated efforts with DEMA.

Communication and Response:

The Level III Alert response involves an increased level of government activity as the fuel supply disruption worsens. The Governor may ask the Motor Fuel Working Group to review the situation in more detail. The Working Group, composed of applicable state agencies, may seek input, data, and information from industry, and upon analysis of those data and information, recommend to the Governor a course of action, under the direction of the Delaware Energy Coordinator. The DEO staff and members of the Motor Fuel Working Group will assess the effectiveness of these voluntary demand reduction measures which are outlined below in "Measures to be implemented."

Based on the characteristics of a "moderate disruption" the DEO shall immediately initiate a Level III ECL. If it is determined, with confidence, that the pipeline will be returned to service there is no need to elevate to a higher ECL nor need to implement additional state action, unless the federal government directs such action. If, however, the shortage becomes more severe and warrants implementation of a Level IV Emergency Phase ECL, the DEMA, as provided within the State of Delaware Emergency Response and Recovery Plan, becomes the lead agency, and DEO and Motor Fuel Working Group will act as support during the course of the emergency.

During a Level III Alert Phase a news release statement outlining the details of the situation and a request for the public's and state agency attention to suggested and mandatory contingency measures will be developed by the DEO and released by the Delaware Energy Office as soon as practicable.

As in the previous Levels the Delaware Energy Office is responsible for scheduling all briefings for the media during the alert Phase. The Delaware Energy Office will provide the Delaware Energy Office accurate information obtained from the DEO for dissemination to the public, advising them on the status of the situation and providing guidelines for energy demand reduction and mandatory programs. The Public Information Officer (PIO) in coordination with the Delaware Energy Office may deliver copies of Situation Reports to State Legislators; prepares briefing packages for the Governor and the State Legislature and answer inquiries from state and local elected officials.

Measures to be implemented:

Public:

- Clearly and firmly relay to the public that there is currently no need to panic.
- Require the observance of posted speed limits and increase enforcement.
- Encourage fuel conservation for the coming week,
- Encourage the use of alternative fuels and transportation.
- Encourage ridesharing for the coming week.
- Establish minimum and maximum fuel requirements to reduce "topping-off" behavior and "stockpiling" of fuel.

State Agencies:

- Implement restrictions on state employee travel.
- Direct state agencies to reduce fuel usage.

LEVEL IV - "EMERGENCY"

Description:

The Level IV Emergency response (a major disruption in fuel supply) may also be characterized by a potential (advanced knowledge) or a realized (occurring) impact on supply to or from retail service stations that is expected to extend beyond three days. Regardless of the cause, the disruption may be characterized by limited or no transport of product to retail outlets, lack of product at retail outlets, and the formation of "gas lines" at retail outlets as a result of public reaction to a supply shortage.

Depending upon the severity of the situation a Level IV ECL could result in conditions that threaten public health and safety, and which would involve immediate coordinated efforts with the DEMA and perhaps assistance from FEMA and DOE.

Communication and Response:

"Level IV ECLs will be communicated immediately to the Delaware Energy Office and DEMA to be governed by the DEMA, under the State of Delaware Emergency Response and Recovery Plan, in consultation with the DEO." (During this level, the DEMA, as provided within the State of Delaware Emergency Response and Recovery Plan, is the lead agency, and the DEO and Motor Fuel Working Group will act as support during the course of the declared emergency.)

Disruption response and details of the events will be immediately communicated to the DEMA. In addition, a news release statement outlining the details of the situation and a request for the public's and state agency attention to suggested and mandatory contingency measures will be developed and released by the DEMA or the Delaware Energy Office as soon as practicable.

Measures to be implemented:

DEMA/DEO (as needed)

- Acquisition of product from alternative sources (*Truck or rail*).
- Odd-Even Motor Fuel Sales Restrictions
- Maximum Purchase for Separate Containers
- Minimum and Maximum Motor Fuel Purchase Requirements
- Posted Hours of Operation
- Prohibited Hours of Sale
- *Retail Service Station Fuel Reserve Plan*
- Uniform Flag System for Motor Fuel Sales
- Initiate Retail Service Station Fuel Reserve System

Public:

- Clearly and firmly relay to the public not to panic.
- Require the observance of posted speed limits and increase enforcement.
- Demand fuel conservation for an indefinite period of time.
- Demand the use of alternative fuels and transportation as possible.
- Demand ridesharing for the coming week.

- Demand adherence to ALL measure listed above.
- Establish minimum and maximum fuel requirements to reduce "topping-off" behavior and "stockpiling" of fuel.

State agencies.

- Implement restrictions *on state* employee travel.
- Demand state agencies to reduce fuel usage. Demand alternative work hours.
- Implement priority user system for access to DELDOT fuel stations located throughout the State.

8.0 OPERATIONAL PROCEDURES

A. Agency

1. Delaware Energy Office (DEO) - Level I – III Incidents

- The Delaware Energy Office (DEO) shall be the lead agency during “shortage situations”, in consultation with the Delaware Division of Weights and Measures. DEMA, the Delaware Energy Office, and the Motor Fuel Working Group
- The DEO will communicate regularly with the U.S. Department of Energy (DOE) Office of Energy Assurance, and update DOE as to the status of a given energy shortage or emergency. The DEO staff will respond to DOE requests for information, including Situation Reports.
- DEO Energy Coordinator shall direct DEO staff to proceed with specific elements of the response plan. Using the data and analysis provided by staff, the GEO Director shall present recommendations to the Governor on how best to respond to the impacts of the motor fuel shortage.
- The DEO staff shall assist the GEO Director in briefing the DEMA and the Governor on the status of an energy shortage. They shall initiate multi-level communications with government and private industry and shall regularly brief the DEO Coordinator on the results of the staff's information gathering and analysis.
- The Motor Fuel Working Group shall monitor the situation, do impact analysis, prepare response plans and reports, and provide program implementation. The Working Group shall maintain a network of contacts with other government levels and private industry.
- The Delaware Energy Office is responsible for scheduling all briefings for the media. The Delaware Energy Office at the direction of the Delaware Energy Office shall disseminate accurate information, obtained from the DEO Staff, to the public, advising them on the status of the situation and providing guidelines for energy demand reduction and mandatory programs.
- The DEO Staff shall be responsible for situation monitoring, analysis of impacts, response planning, report preparation, and program implementation. The staff will maintain a network of contacts with other government levels and private industry.

2. Delaware Division of Weights and Level I – III Incidents

- The DEMA may activate the Delaware Energy Emergency Response Plan when one or more of the three identified triggers are met.
 - Extended refinery shutdown
 - A major supplier shutdown
 - Independent supplier calls
- The DEO Coordinator will authorize staff to begin collecting data including the following;
 - terminals
 - pipeline tickets
 - retail marketers, station inventories/closures
- The DEO Coordinator will be able to supply answers to the following:
 - How much fuel is in the terminals
 - How much is expected in the near future
 - What is the historical demand
 - How many retail outlets are operational
- The DEO Coordinator will initiate the internal communication plan to inform field personnel that routinely interact with service station personnel and the public.

3. Environmental Quality

- At the Moderate Disruption Level, the DEO Coordinator, in consultation with the Delaware Energy Office and the Motor Fuel Working Group, may initiate preliminary contacts with the U.S. Environmental Protection Agency – Office of Enforcement and Compliance Assurance (OECA) about a possible request of a No Action Assurance decision. Such requests will adhere to the format prescribed in OECA's August 27, 2004 memorandum "Procedure and Framework for Reviewing Requests for No Action Assurance to Address a Temporary Fuel Supply „Shortage”" (link).

4. Delaware Department of Transportation (DELDOT) - Level I – III Incidents

- Assess current fuel inventory at each DELDOT fueling location
- Work with fuel vendors on product delivery status
- Implement Conservation Measures – (DELDOT ONLY)
- Submit an information bulletin to departments and other agencies with information on fuel system status
- Establish a fuel use priority list by agency/organization/vehicle emergency response vehicles etc.

5... Delaware Emergency Management Agency (DEMA) - Level I – IV Incidents

- Participate in Governor's Motor Fuel Working Group
 - Maintain communication with DEO
- B. Industry
- C. Stakeholders

Participating Agencies:

- Delaware Energy Office (DEO)
- Delaware Public Service Commission
- Delaware Emergency Management Agency (DEMA)
- Delaware Weights and Measures
- Delaware Attorney General's Office
- Delaware Department of Transportation

Cooperating Agencies:

- U.S. Department of Energy (DOE) Office of Energy Assurance
- U.S. Environmental Protection Agency

Individual and Group Resources:

- Governor
- Delaware Energy Office Coordinator
- Delaware Energy Office Staff
- Delaware Energy Office Work Groups
- Governor's Public Information Officer

General Resources:

- Statewide list of retail service stations participating in emergency fuel distribution
- State Emergency Operations Center

APPENDIX E – FEDERAL AGENCY ASSISTANCE

1.0 U.S. DEPARTMENT OF ENERGY

DOE's energy emergency support responsibilities and capabilities are distributed among several elements within the Department. DOE sets forth the missions of the key elements as follows:

1.1 OFFICE OF POLICY

This Office is the principal advisor to the Secretary, Deputy Secretary, and Under Secretary on energy and technology policy issues, including the environmental consequences of energy use. This Office has primary responsibility for the formulation and development of national energy policy and for the conduct of policy analyses. It analyzes, develops, and coordinates departmental science and technology policy, environmental policy including global change policy, and economic policy. It is also responsible for advising the Department's senior management on issues related to the Department's environmental security and energy emergency policies.

1.2 OFFICE OF ENERGY ASSURANCE (OEA)

This Office operates DOE's Emergency Management System, Headquarters Emergency Operations Center (Forrestal Building), the Technical Support Center (Germantown, Maryland) and insures integration and compatibility of all Departmental emergency operations facilities. OEA insures integration and compatibility of all Departmental emergency operations facilities. In order to meet its national security requirements and responsibilities contained in the Federal Response Plan, DOE has established mandatory reporting requirements for electric power system incidents or possible incidents. Such incidents are to be reported to the Department through its EOC on a timely basis.

The OEA is also responsible for Critical Infrastructure Protection. It manages Departmental activities that support DOE's role as lead agency for Government interaction with the nation's energy sectors regarding critical infrastructure protection. In this role, OEA develops and manages the critical infrastructure protection R&D program, and leads and coordinates Departmental efforts to work with industry, state and local governments and national and international entities in accordance with Presidential Decision Directive 63 (Policy on Critical Infrastructure Protection). This Directive calls for a series of actions that are designed to defend our critical infrastructures from various threats. The Directive also identifies lead federal agencies for each critical infrastructure; the U.S.

1.3 ENERGY INFORMATION ADMINISTRATION (EIA)

EIA was created by Congress in 1977. It is a statistical agency of the U.S. Department of Energy that provides policy-independent data, forecasts, and analyses to promote sound policy making, efficient markets, and public understanding regarding energy and its interaction with the economy and the environment. EIA distributes four types of information products: Energy data, analyses, forecasts, and descriptive information about our products. Many of the products, such as the *Petroleum Supply Monthly*, deal with specific industries.

Of particular value to a broad range of customers are products that contain data on all fuel types presented in an integrated manner. Some key releases of integrated information are the *Monthly Energy Review*, the *Annual Energy Review*, the *Short-Term Energy Outlook*, and the *Annual Energy Outlook*.

Most of the energy data are collected by EIA staff who design and send our statistical surveys to energy producers, users, transporters, and certain other businesses. Companies and households report directly to us. EIA also obtains energy data from other sources, such as trade associations and other government agencies.

EIA's analysis products are technical reports and articles that analyze issues about energy including economics, technology, energy production, prices, distribution, storage, consumption, and environmental effects. The Administration's forecasts cover all energy types, and include forecasts of supply, consumption, prices, and other important factors. There is a short-term forecast that goes out 6 to 8 quarters in the future, and a midterm forecast that goes out 20 years. Some of EIA's forecasting models are available on their Web site at <http://www.eia.doe.gov>. Other EIA products are descriptions of information products that include directories of survey forms, lists of publications, electronic products and models, a guide to energy education resources, and complete lists of energy data contacts to call who have answers to energy questions.

1.4 ADDITIONAL ACTIVITIES

The following actions are taken in an emergency that requires activation of the Federal Response Plan and ESF-12.

- DOE Headquarters will establish the Headquarters Emergency Management Team (EMT) and assign personnel to temporary duty at the Federal Emergency Management (FEMA) Headquarters, Regional Operations Center, and Disaster Field Office as needed;
- The ESF-12 priority will be to save lives, protect property, and assist other ESFs by aiding in the restoration of damaged energy systems; and
- Within 24 hours of implementation of the Federal Response Plan or upon instruction from FEMA, DOE Headquarters will start submitting situation reports to FEMA Headquarters.

2.0 FEDERAL EMERGENCY MANAGEMENT AGENCY AND THE FEDERAL RESPONSE PLAN

2.1 FEMA ROLE AND RESPONSIBILITY

Under the Stafford Act and Executive Orders 12148, *Federal Emergency Management*, and 12656, *Assignment of Emergency Preparedness Responsibilities*, the Federal Emergency Management Agency has been delegated primary responsibility for coordinating Federal emergency preparedness, planning, management, and disaster assistance functions. FEMA also has been delegated responsibility for establishing federal disaster assistance policy.

2.2 FEDERAL RESPONSE PLAN

FEMA has the lead in developing and maintaining the Federal Response Plan which describes the structure for organizing, coordinating, and mobilizing federal resources to augment state and local efforts under the Stafford Act and its implementing regulations that appear in 44 CFR 206. The FRP also may be used in conjunction with federal agency emergency operations plans developed under other statutory authorities as well as memorandums of understanding (MOU) among various federal agencies. The FRP is implemented through regional supplements developed by FEMA, and the regional offices of other federal agencies, that describe specific actions, operating locations, and relationships to address the unique needs of the region and states. From time to time, operations supplements to the FRP may be issued to address special events that merit advanced planning, such as the Olympics or Presidential inaugurations.

2.3 ORGANIZATION OF THE FRP

The FRP consists of six sections, two of which are the Basic Plan and Emergency Support Function Annexes. The Basic Plan presents the policies and concept of operations that guide how the federal government will assist disaster-stricken state and local governments. It also summarizes federal planning assumptions, response and recovery actions, and responsibilities. Separate Emergency Support Function Annexes describe the mission, policies, concept of operations, and responsibilities of the primary and support agencies involved in the implementation of key response functions that supplement state and local activities. Energy is ESF-12.

3.0 STATE ASSISTANCE

Under the Stafford Act, a Governor may request the President to declare a major disaster or an emergency if an event is beyond the combined response capabilities of a state and affected local governments. Based upon the findings of a joint Federal-State-local Preliminary Damage Assessment (PDA) indicating the damages are sufficient to warrant assistance under the Act, the President may grant a major disaster or emergency declaration. No direct Federal assistance is authorized prior to a Presidential declaration. However, FEMA can use limited pre-declaration authorities to move Initial Response Resources (critical goods typically needed in the immediate aftermath of a disaster, e.g., food, water, emergency generators) and emergency teams closer to potentially affected areas. FEMA also can activate essential command and control structures to lessen or avert the effects of a disaster and to improve the timeliness of disaster operations.

4.0 ADDITIONAL ASSISTANCE

Additionally, when an incident poses a threat to life and property that cannot be effectively dealt with by state or local governments, FEMA may request the Department of Defense (DOD) to utilize its resources prior to a declaration to perform any emergency work “essential for the preservation of life and property” under the Stafford Act. Following a declaration, the President may direct any federal agency to use its authorities and resources in support of state and local assistance efforts to the extent that provision of the support does not conflict with other agency emergency missions. A state must commit to pay a share of the cost to receive certain types of

federal assistance under the Stafford Act. In extraordinary cases, the President may choose to adjust the cost share or waive it for a specified time period. The Presidential declaration notes any cost-share waiver, and a FEMA- State Agreement is signed further stipulating the division of costs among federal, state, and local governments and other conditions for receiving assistance.

5.0 ENERGY CONSEQUENCES

A natural disaster, such as an earthquake, may produce energy consequences such as pipeline ruptures disrupting petroleum transmission and natural gas or transmission tower collapses interrupting gas flow and electric transmission. Conversely, failure of a primary transmission line may result in an energy emergency in its own right.

APPENDIX F – MONITORING FUEL SUPPLIES

Energy supply monitoring should take place regularly. State Energy Offices and Public Utility Commissions keep track of energy developments pertaining to the state, its region, and the nation through industry contacts, trade publications, and statistical reports. The EIA web site <http://www.eia.doe.gov/> provides an abundance of reports and statistics on all types of energy, arranged in a variety of ways to make the data easy to find.

I. MONITORING ELECTRICITY

1.1 GENERAL INFORMATION

Day-to-day electricity supply and demand are monitored on a routine basis by operating companies. Utilities generally prepare annual forecasts estimating demand for electricity and the means to satisfy it for the following five years. Other forecasted information includes:

- expected price for fuel and other necessary purchases;
- expected fuel and purchased power availability; and
- plant status and similar data.

1.2 REPORTING TO THE DOE

Utilities are also required to report to the DOE Emergency Operations Center any of the following events:

- loss of firm system loads;
- voltage reductions;
- requests to the public to reduce usage;
- vulnerabilities that could impact system adequacy or reliability; and fuel supply emergencies (see Power System Emergency Reporting Procedures, May 1989, U.S. DOE).

1.3 DATA SOURCES

1.3.1 ELECTRICITY SALES

Monthly sales of electricity are published by state, month, and sector by the EIA in the *Electric Power Monthly* (found at http://tonto.eia.doe.gov/dnav/pet/pet_sum_top.asp

1.3.1.1 ELECTRICITY PRODUCTION BY FUEL SOURCE

This information is published in the EIA *Electric Power Monthly*

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

http://tonto.eia.doe.gov/dnav/pet/pet_sum_top.asp that includes, in English units (tons and barrels):

- the quantity of fuel used; kilowatt-hour produced;
- fuel costs by state. the source of this information is the *Monthly Report of Cost and Quality of Fuels for Electric Plants*, FERC-423
- Levels Fuel Inventories Available for Generation Coal inventories and prices are published in the EIA *Quarterly Coal Report* http://tonto.eia.doe.gov/dnav/pet/pet_sum_top.asp lists the amount of coal consumed in each state and the price paid by each sector. Levels of fuel inventories will be estimated by each utility and reported by the number of days of supply on hand at each location for coal and oil-fired plants.

1.3.1.2 GENERATION CAPACITY AND PLANT AVAILABILITY

This information can be obtained from the *Inventory of Power Plants in the United States*

http://www.eia.doe.gov/cneaf/electricity/ipp/ipp_sum.html published by the EIA.

1.3.1.3 REGIONAL SYSTEM RELIABILITY FORECAST

NERC (<http://www.nerc.com/>) publishes annual reports of regional system reliability. These reports assess regional reserve margins by comparing net system availability with peak load projections and system-pool reserve availability.

1.3.1.4 COAL DISTRIBUTION

This data is published in the EIA *Quarterly Coal Distribution Report* (http://www.eia.doe.gov/cneaf/coal/quarterly/qcr_sum.html) and is a source of information regarding the origin and method of shipping coal.

1.3.1.5 COOLING AND HEATING DEGREE DAYS

Cooling and heating degree day data are available from the National Weather Service and National Oceanic and Atmospheric Administration

(NOAA). http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/. This data may be used to describe extreme weather conditions that create peak loads on the electrical generation system.

1.3.1.6 CONTACT NAMES, ADDRESSES, AND TELEPHONE NUMBERS

It is important to maintain a list of key utility personnel involved with emergency operations at key locations.

Exercise caution when using and integrating data from these various sources. Direct communication with electric utilities and the state agencies will be helpful in avoiding inaccurate conclusions.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

1.3.2 MONITORING NATURAL GAS

1.3.2.1 COMPLEXITIES IN MONITORING NATURAL GAS

Natural gas markets have become more complex to monitor in recent years as a result of the direct purchase agreements between large users and wellhead producers. This decentralization has resulted in a significant decrease in available data. Adequate monitoring of natural gas requires information covering:

- the quantity of interstate deliveries to LDC;
- storage levels;
- gas injection rates into storage;
- projected system send-outs;
- spot market and contract prices;
- curtailment notices; and
- heating degree days.

1.3.2.2 DATA SOURCES

1.3.2.2.1 INTERSTATE DELIVERIES TO LDC

Natural gas deliveries by sector are shown in the EIA *Natural Gas Monthly* (http://www.eia.doe.gov/oil_gas/natural_gas/data_publications/natural_gas_monthly/ngm.html), that shows the amount of natural gas delivered into the state for sale.

- Storage Levels and Injection Rates State natural gas inventories are reported in the EIA *Natural Gas Monthly*,
- (http://www.eia.doe.gov/oil_gas/natural_gas/data_publications/natural_gas_monthly/ngm.html). From this information the percentage of storage capacity being used at any time can be calculated.

1.3.2.2.2 PROJECTED SYSTEM SEND-OUTS

Natural gas demand and supply projections are provided by the LDC as part of their annual GCR filings. These projections include storage field inventory balances. Potential shortages can be identified when long-term supply is inadequate to meet projected demand.

1.3.2.2.3 SPOT AND CONTRACT PRICES

Average city gate prices (price to the LDC as gas is received), and prices by sector, for each state are published in the EIA *Natural Gas*

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

Monthly, (http://www.eia.doe.gov/oil_gas/naturalgas/data_publications/natural_gas_monthly/ngm.html). Price is an indicator of aggregate supply.

When short-term prices are lower than long-term contract prices, supplies are generally judged to be in excess of demand. Conversely, when long-term contract prices are lower, spot markets are assumed to be tight, indicating that demand may be exceeding supply.

1.3.2.2.4 CURTAILMENT NOTICES

Interstate pipelines provide notices of curtailments to FERC. Notices of curtailment are early indicators of reduced supply. The supplementary supply required to offset the reduction in deliveries may need to be calculated and perhaps satisfied from other in-state supplies, depending upon the current levels of storage volumes, actual system send outs, and inter-tie exchanges.

1.3.2.2.5 HEATING DEGREE DAYS

Heating degree-day information is provided the National Weather Service on a daily and monthly basis, http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/. Statistics can often be obtained through local or regional weather stations. These values indicate periods of extreme cold weather that bring on increases in demand for natural gas for space heating.

1.3.2.2.6 CONTACT NAMES, ADDRESSES AND TELEPHONE NUMBERS

A list of individuals that are involved with emergency-related activities and planning in state government, at local distribution companies, and interstate pipeline companies is be needed in any plan (see Appendix A).

2.0 MONITORING PETROLEUM

2.1 MONITORING PETROLEUM MARKETS

Petroleum markets are monitored continuously by marketers and commercial buyers. Statistical organizations such as the EIA maintain databases containing information used to determine recent market behavior and anticipate supply disruptions. The American Petroleum Institute (API) (<http://www.api.org/statistics/>) is another source of information. While it is relatively easy to obtain aggregate petroleum data, the nature of the petroleum market, and the lack of regulation, makes learning about individual companies relatively difficult. Following are some suggestions for working with the industry to obtain information.

2.1.1 LIAISON

To ensure proper interpretation of the data, contact is maintained with liaisons within the petroleum industry. Monitoring requires a variety of data, including:

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

- petroleum product use; Prices;
- Inventories; Production; and
- sources of crude oil.

2.1.2 PETROLEUM INFRASTRUCTURE

Petroleum supply infrastructure information is useful. Examples include:

- marine and pipeline terminals;
- locations of terminals;
- terminal capacity; and terminal product transfer capability (i.e., number of loading rack positions). Most important, monitoring also requires accurate and timely information about:
- Inventories; and
- production rates for state and regional refineries.

2.1.3 DECENTRALIZED DELIVERY NETWORK

Because petroleum is distributed through a decentralized network, there is no single source of information by which to assess or characterize emerging problems. Anti-trust laws also prohibit oil companies from sharing information regarding supply availability and price. Consequently, petroleum information is either published by a third party that can maintain the anonymity of sources or is confidential and not available. Therefore, the state's role in developing data and assessing supply is more critical for petroleum products than it is for electricity or natural gas, where utilities control supply and distribution within franchised service territories.

2.1.4 ESTIMATING THE SEVERITY OF A SHORTAGE

The severity of a fuel shortage can be estimated by reference to various indicators, but to quantify a statewide shortage in terms of an accurate percentage of shortfalls is difficult. Further, due to the variety of supply arrangements, distribution systems, and local consumption patterns, some communities may experience a more serious shortfall than others. Therefore, it is not always useful to tie the phases of a flexible energy emergency plan to specific percentage shortage levels.

2.1.5 SUPPLY AND DEMAND

The following sources provide information useful in monitoring petroleum supply and demand

2.1.5.1 MOTOR FUEL CONSUMPTION (GASOLINE)

The total number of gallons of gasoline used is provided on a monthly and annual basis of motor gasoline sales revenue by the Federal Highway Administration. The data can be found on at: <http://www.fhwa.dot.gov/index.html>.

STATE OF DELAWARE ENERGY ASSURANCE PLAN 2010-2012

2.1.5.1.1 PETROLEUM PRODUCT DEMAND

Monthly deliveries of petroleum products to states by primary suppliers are reported in the EIA *Monthly Report of Petroleum Products Sold into States For Consumption*, (http://www.eia.doe.gov/oil_gas/petroleum/info_glance/consumption.html)

2.1.5.1.2 FORM EIA-782C.

This report contains actual deliver volumes for the proceeding month for each petroleum product supplied and projected deliveries for the upcoming month. This information is necessary in order to determine the severity of a petroleum shortage and to calculate the amount of petroleum product to be set aside for emergency hardships. Monthly historical sales of all petroleum products by state are also reported in the EIA C-007 Report, *First Sales of Petroleum Products into States for Consumption*.

2.1.5.1.3 FORM EIA-782C WHOLESALE AND RETAIL PRICES WHOLESALERS

Wholesale and Retail Prices Wholesale and retail prices are available on the EIA web site at:

http://www.eia.doe.gov/oil_gas/petroleum/info_glance/prices.html. The data include weekly and monthly prices such as the EIA *Petroleum Marketing Monthly*, that provides monthly information regarding wholesale and retail prices at the state-level and the *Weekly Petroleum Status Report*, that provides information on national and international prices and inventory information. In an emergency, more timely information is needed and may be obtained through industry publications such as Oil Price Information Service's OPIS-Alerts or the *Oil Daily*. Special state-conducted telephone surveys of petroleum distributors and retailers are also conducted.

2.1.5.1.4 INVENTORIES AND PRODUCTION

Inventory (stocks) and production data can be found on the EIA web site at: http://www.eia.doe.gov/oil_gas/petroleum/info_glance/stocks.html and

http://www.eia.doe.gov/oil_gas/petroleum/info_glance/exploration.html. Data are presented weekly and monthly by region. Data are reported by regional areas known as Petroleum Administration for Defense Districts (PADD). State level monthly inventories are also published in this report. Weekly data are also available through the API *Weekly Statistical Bulletin* (<http://www.api.org/statistics/>) at PADD level aggregations.

2.1.5.1.5 INFRASTRUCTURE INFORMATION

Relevant information includes a listing of refineries serving the state, their production and storage capacities, the location and capacities of pipelines and terminals, and marine terminals. This information is compiled from various sources including state, industry and other private sources. A list of operable refineries can be found in EIA *Petroleum Supply Annual* at:

http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/petroleum_supply_annual/psa_volume_1/current/pdf/table_38.pdf

2.1.5.1.6 SOURCE OF CRUDE OIL

The source and volumes of crude oil supply used by regional refineries may be found in the EIA *Petroleum Supply Monthly*

(http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_monthly/psm.html). This information is needed to estimate the extent to which refiners may need to shift supplies if any given source of crude oil is disrupted. For example, when crude oil was embargoed from Iraq and Kuwait in 1990, the effects of this action on Midwest supplies was able to be determined.

2.1.5.1.7 HEATING DEGREE DAYS

Heating degree-day information is provided by the National Weather Service on a daily and monthly basis,

(http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/). Statistics can often be obtained through local or regional weather stations. These values indicate periods of extreme cold weather, which bring on increases in demand for heating fuels for space heating.

2.1.5.1.8 CONTACT NAMES, ADDRESSES, AND TELEPHONE NUMBERS

This information is obtained directly from the oil companies or their various associations and is periodically updated. State petroleum and dealer associations are excellent sources for the names of jobbers and distributors involved with the sale and distribution of gasoline, distillate, LPG and other petroleum products (see Appendix A).

APPENDIX G - ENERGY RESPONDERS INFORMATION

1.0 DELAWARE'S STATE ENERGY PROFILE

Delaware's energy profile contains the elements of a state's energy industry so that responders will know how various energy supply systems work and whom to contact during a shortage.

1.1 THE BASICS OF A STATE ELECTRICITY INDUSTRY

1.1.1 INVESTOR OWNED UTILITIES

Investor owned utilities (IOU), dominate the nation's electricity industry. They own most of the generating plants and transmission lines. In states with a strong cooperative or municipal system, the local IOU still provides most of the generated power resold to consumers. IOU are regulated by the state's utility regulatory body for tariff, reliability, safety, consumer priorities, growth and emergencies. IOU have been traditionally owned by local investors but in several regions of the nation, they have merged into regional investor owned entities and become local subsidiaries.

1.1.2 ELECTRIC MEMBERSHIP COOPERATIVES (EMC)

Most states have electrical cooperatives that originally served rural customers. The growth of suburbs, towns and cities has blurred this distinction. Cooperatives typically own and maintain significant local delivery capacity through less populated areas. They usually belong to a state-wide electric membership cooperative association, or corporation, that acts on their behalf in many intra and inter-state matters, helps them purchase power, manages safety training and assists during emergencies by receiving and transferring information, coordinating repair crews and helping companies exercise mutual aid agreements if needed. Cooperatives generally have mutual aid agreements with other cooperatives – in state and in neighboring states. Most cooperatives manage their own affairs and answer to a board of directors. PUC do not generally regulate their rates but it is not uncommon to see some linkage between the PUC and cooperatives on safety and emergency matters.

1.1.3 MUNICIPAL ELECTRIC UTILITIES

Municipalities throughout the US own and operate their own utilities. These utilities account for a smaller percentage of delivered electricity than IOU and EMC. Most belong to state associations, or corporations, that provide services to their members similar to those offered by EMC associations. Some municipal utilities (and cooperatives) also own generating plants and transmission lines or participate in larger organizations that do this for them. Municipals rarely fall under PSC jurisdiction for either rates or safety and emergencies. Like EMC, they do have extensive mutual aid agreements. For all three of the ownership types is it useful to know:

- who owns the utility;
- where the utility is located and the area(s) it serves;

- how the utilities manage outages including mutual aid agreements, and restoration priorities;
- to whom and how do utilities report emergencies;
- what steps utilities take to prevent and or mitigate the loss of power and the failure of infrastructure;
- what public laws and regulations apply; and
- the typical restoration sequence they employ to restore power in various areas – urban, sub-urban and rural.

1.1.4 GENERATION PLANTS

The first place a state energy planner looks for electrical generation is the IOU. As noted in the body of the guide, electric restructuring is pushing many IOU to break up vertically integrated assets so that planners should look for generating capacity owned and delivered from out-of-state companies as well as those owned and operated by in-state IOU. States should also identify independent sources of power such as merchant plans, co-generation plants and large industries that sell excess power.

1.1.5 INTERSTATE SALES

Utilities have long shopped for lower cost power if available outside of their own systems. Deregulation, combined with economic competition, the growth of large interstate transmission grids and a growing number of interstate marketing entities, has encouraged large end users to purchase power from many available sources for the best price in addition to, or instead of, locally-generated power.

1.5.6 DESIRED DATA

The best places to search for data are the state PSC and the EIA. Even if a PSC does not regulate all generation or transmission affecting a state, it is likely to know who sells power, where it is located and what it costs. EIA data also will help determine where the bulk of a state's power comes from and in what sectors it is consumed. Information to examine includes:

- megawatts generated;
- megawatts imported;
- reserve capacity;
- exports;
- principal facilities and location;
- customers served (preferably broken out by type); and
- infrastructure failure prevention and back up.

1.5.7 TRANSMISSION

Vertically integrated IOU own the bulk of US transmission lines. Electric restructuring is beginning to change this. Divestiture of vertically-owned assets has resulted in independently-owned (usually conglomerate) transmission systems. As the interstate sale of power has increased, so has the complexity of transmission. Hence, electric problems in one area have caused outages in other systems hundreds of miles away.

It is recommended that states look for sources of major power transmission as well as in-state delivery systems. Precise trunk and branch line location may not be necessary, but a general knowledge of where they are, and what external conditions may affect them, is useful to have.

Many state power systems fall within RTO and that are committed to improve reliability. States should get to know the RTO, if one exists, and understand what it does to distribute and route power and prevent failures. State officials should also understand the role of the Electric Reliability Councils and how their impact.

The same two sources a state needs for generation apply to transmission as well. Start with the PUC and the EIA when seeking information. Useful information to cover includes;

- line location;
- line capacity
- ownership; and
- infrastructure protection and restoration protocols.

1.5.8 THE BASICS OF THE STATE'S NATURAL GAS INDUSTRY

The natural gas industry can be roughly divided into three categories: production, transmission and distribution. In states with gas production, gas can be supplied to consumers directly from the well-head, or going through gas processing units where liquids are removed. Most states, buy gas from inter-state transmission lines.

1.5.8.1 STRUCTURE AND OWNERSHIP IN THE GAS INDUSTRY

Gas is produced by large national oil and gas companies plus a myriad of relatively small owners and operators who sell their gas to processing plants or transmission companies. The major transmission companies, such as Columbia, may also have an interest in local distribution companies.

1.5.8.2 LOCAL DISTRIBUTION COMPANIES

The primary companies delivering gas to consumers are called LDC. They obtain gas from various producers or interstate transmission pipelines. LDC are regulated by PSC for the same factors found in the electric market. LDC, like electric utilities, are investor owned and also, like electric companies, subject to consolidation. In some states, the same company sells both electricity and natural gas. Additionally, independent companies have emerged that are not regulated for tariff by PSC, but must comply with various operating, safety and environmental regulations. It is useful to know:

- millions of cubic feet imported;
- how much each company nominates (contracts to buy);

- volume of cubic feet produced if applicable.
- storage capacity available to the state (both in- and out-of-state);
- export volume if applicable;
- principal facilities and location;
- ownership;
- customers served (preferably broken out by type); and
- infrastructure failure prevention and back up.

1.5.8.3 NATURAL GAS INFRASTRUCTURE

Natural gas companies, like electricity companies, have always sold to a wide variety of end users. Large volume energy buyers can obtain an industrial or commercial rate that is more closely attuned to the market than residential rates that are adjusted to provide predictable and manageable prices for home consumption. Many states have allowed large industrial, commercial and institutional consumers to buy natural gas directly from producers while the LDC serves as a transmission company delivering gas to the end use for what is basically a freight rate plus certain fees. Many states have now extended open market purchase to residential users as well. The result is that many users of natural gas now purchase gas at market, rather than tariff-controlled rates. At least one state has basically deregulated its natural gas market so that the long-standing LDC became a wholesale distributor to several independent, market based, companies. For LDC and other ownership types it is useful to know:

- who owns the companies;
- where the companies are located and who they serve;
- how the companies manage storage;
- how the companies manage supply shortage;
- to whom and how do they report emergencies;
- how the companies repair pipeline ruptures and restore gas, including their mutual aid agreements and restoration priorities;
- what they typically do to prevent the loss of gas and mitigate infrastructure failure or damage;
- what public laws and regulations apply; and
- their typical restoration sequence to various areas – urban, sub-urban and rural.

1.2 BASICS OF THE STATE'S PETROLEUM INDUSTRY

1.2.1 OWNERSHIP STRUCTURE

A typical state petroleum industry is composed of several layers of ownership. Whether produced in or out-of-state, the produced oil must be refined before it is sold to consumers. States closest to refineries may enjoy lower pipeline transportation costs. In some cases,

ownership may be wholly, or partially, vertically integrated from production through retail sales; hence the levels listed below may overlap. Levels of ownership pertinent to state petroleum consumption include:

- Production Companies - Identifying these companies is "nice-to-know" but not critical for state planning purposes.
- Refineries - It is useful, but not absolutely necessary, to know which refineries supply a state's petroleum. If known, potential shortages can be identified early when a supplying refinery curtails production or shuts down for any reason.
- Primary Suppliers - The DEO should identify every company that imports oil into the state so that it can maintain import volume information and know whom to contact if a state Set Aside is necessary.
- Pipeline Companies - Each state should identify the owners/operators of inter-and intra-state pipelines importing and shipping petroleum to and within the state.
- Wholesale Distributors (or Jobbers)- These companies may be subsidiaries of national or regional entities, or they may be independent. They are key players in the transfer of petroleum products from pipelines (or from barges and ships, if applicable) to retailers. They generally operate facilities, called terminals, at which product is transferred from interstate carrier for local delivery. State officials should know who these jobbers are, or at a minimum, be in contact with the state organization that represents them. It is also useful to know the location of various terminals throughout the state as well as the volume per day transfer capacity of each facility. Other information a state can try to obtain from jobbers includes:
 - areas served;
 - principal roadways used;
 - numbers of residential, commercial, institutional and industrial customers;
 - access to, and volume of, available storage;
 - emergency plans if any;
 - volume of product delivery (per specified period of time); and
 - names of non-oil company transporters who may be hired to deliver product.
 - **Remember**, petroleum companies are unregulated and are not obligated to provide information. Various petroleum associations may be a better source for some or all of this data.

1.2.2 RETAILERS

Motor gasoline is sold primarily through retail gasoline outlets. While it is useful to know the number and location of operating outlets on a yearly basis, these outlets change hands often. Knowing the total number of state retail outlets is usually sufficient.

Home heating oil and LPG retailers will be significantly fewer in number than motor gasoline service stations. A list of these companies is very important for providing assistance to low income customers during a shortage. Knowledge of what jobber terminals they use is helpful.

Note: in some states a terminal is a major wholesale facility. In others, it may include every retail heating oil company with a truck. There is no standard for this.

Consumption Profile

EIA provides relatively up-to-date data for in-state sales of all retail petroleum products. Charts and graphs from the EIA provide valuable information for understanding how various shortages impact different consuming sectors and the relative importance of each type of petroleum product within a state's economy.

1.3 VULNERABILITY ASSESSMENT

A vulnerability assessment will help state energy emergency planners understand the relationship between the state's energy providers, energy imported and customers. The aim of an assessment is to associate geographic and consumption patterns with energy supply in order to predict the impact of a shortage on various customers and areas within a state.

1.4 DEMOGRAPHICS

Some of the demographic factors planners should consider exploring in order to do a vulnerability assessment are:

- Population
- housing profile
- employment profile
- sector energy use (or include in Energy Profile).

1.5 ENERGY EMERGENCY STAKEHOLDERS

Stakeholders are those entities who participate in a state's energy marketplace in some manner. Obvious stakeholders are the various energy companies that generate, transmit and sell power or fuel. Others include agencies identified in ESF-12. Clearly, the DEO should be a stakeholder even if it is not specifically identified as one because of its location within state government. One could argue that the public is a stakeholder as well. For the purpose of emergency planning, the public's interest is identified through the energy use profile and the demographics contained in the vulnerability assessment. A plan should contain the following:

- State energy providers identified and described.
- State agencies identified in ESF-12, the DEO and others as applicable. (e.g., Attorney General, People's Counsel).
- Energy, company and dealer associations and related organizations
- County and municipal government organizations including: Emergency management and State-wide government associations.
- Out-of-state stakeholders including:
 - Interstate energy holding companies doing business in state.
 - Federal agencies.

- Regional entities.
- Cross cutting organizations including:
 - Social service agencies assisting consumers.
 - Private and non-profit relief agencies.

1.6 ASSESSMENT

Evaluate potential vulnerability to energy shortages for various end users and locations, and for a variety of reasons, in light of the state's energy profile, its demographics and the interests of its stakeholders.

APPENDIX H NASEO'S QUICK GUIDELINES

NASEO's Quick Guidelines: Ten Things You Should Know

NASEO's Guidance for State

Energy Emergency Information Coordinators - March 2003

1. **The Governor takes the heat when there is an energy supply disruption. Make sure you and your staff are prepared to deal with the situation and intrastate political pressure.**

In Summary:

Be familiar with state procedures for declaring emergencies and with the National Governor's (NGA) Energy Emergency Policy.

NGA Energy Emergency Policy - 18.7 Energy Emergency Preparedness

States have played a unique and important role in response to past energy crises and must maintain their ability to meet their responsibilities to mitigate the effects of future supply disruptions or shortages. It is imperative that states and the federal government develop strategies for responding to a broad variety of possible energy and electricity emergencies. Initial efforts should focus on strategies to prevent emergencies from occurring. Efforts to diversify our energy systems while maximizing our use of cost-effective domestic energy resources are part of this long-term effort. Additional efforts must focus on planning the response federal and state governments would take if an energy or electricity emergency occurs. Any federal actions must give consideration to existing state laws and programs, and state and local officials must be included in any federal planning process. Voluntary conservation should be preferred to mandatory measures whenever possible. Any mandatory response should be phased in, beginning with the least stringent measures, with rationing reserved for only the most severe shortage. To facilitate emergency preparedness, the Governors support the following measures:

- *It is essential that integrated emergency response plans and procedures be developed and well tested to ensure the coordination and flow of information among energy suppliers; consumers; and federal, state, and local governments.*
- *Fuel switching capability for large energy users to reduce dependence upon a single fuel source should be encouraged.*
- *A timely official review of the Strategic Petroleum Reserve (SPR) should be undertaken by Congress and the Administration to determine its ideal size. The Administration also should establish more specific criteria for determining when the SPR should be tapped, taking into account regional reserves. Upon a Governor's declaration of an energy or electricity emergency, non-exempt*

- *federal facilities within a state should be required to reduce their energy consumption by at least 10 percent from the previous year's consumption, for the duration of the emergency.*

Time limited (effective Annual Meeting 2001-Annual Meeting 2003). Adopted Annual Meeting 2001.

2. Know Your State's Energy Profile.

Useful energy emergency planning begins with knowledge of the fuels used within your state. Someone in the agency should understand the sources, volume, and import routing of these fuels. Once you know the state's fuel profile, you can gauge the most vulnerable consumption sectors or you can readily identify the impacts of inclement weather, pipeline or power outages, etc.

In summary:

- Understand the state and local energy market(s).
- Know the relationship of local markets to regional and national markets.
- Stay current with EIA State Energy Data pertaining to your state.
- Cover all of the energy and fuel types:
 - Electricity,
 - Natural Gas,
 - Motor Gasoline,
 - Aviation Fuels,
 - Propane,
 - Heavy industrial fuels,
 - Distillates,
 - Renewables,
- Know how much energy your state consumes on a monthly basis. *Note: most data is published monthly and you can divide by 30 to get daily information.*

3. Know Your Key Government and Industry Contacts

Energy emergency preparedness is highly dependent on knowing who is responsible for what and how to locate them. Many, if not most, energy shortage situations can be resolved with a telephone call or direct communication with a key industry or state stakeholder. As a matter of fact, 9 out of every 10 shortages or supply disruptions are resolved without an emergency ever being declared. In addition, knowledge of your state's demographics is a must for understanding the impacts of shortages.

In summary:

- Understand the relationship of population centers to rural areas
- have good demographic information for your state
- Know key persons in your state's key energy supply sectors

- Petroleum
- Natural gas
- Electricity
- Coal
- Other
- Know key players in the various energy consuming sectors. This could be associations or other groups such as residential, commercial, industrial.
- Know the key emergency and/or energy-related personnel in other agencies of state government (including the Governor's Office and state emergency management agency) and major local governments.
- Know key personnel in neighboring state energy offices.
- Know key personnel in your DOE regional office.
- Understand the role of your public utility commission in safeguarding electric and natural gas operations and energy pricing. Have a current emergency personnel contact list for all utilities, public, private, large and small. Have a current e-mail distribution list of the EEIC contacts and secondary contacts in surrounding states.

4. Maintain a Current File of Legal Authorities

Responding to an energy shortage has many legal implications and the private sector stakeholders with whom you must work are very much aware of this. Avoid the temptation to do things the law will not allow.

In summary:

- Know informal "pecking" order for dealing with emergencies.
- Understand the rules promulgated by your public utility commission pertaining to local distribution company power restoration and safety.

5. Remember Energy Locations and Keep Them Current

Geography is an important component of emergency preparedness. Most states have distinct regions with parochial supply requirements. These must be understood in order to craft an appropriate response. Knowing import and supply geography will help officials focus on the supply and retail facilities closest to a problem. Knowing how the regional energy supply network works is very important.

In summary:

- Know the sources of energy imported into your state and how it moves into the state
- Pipelines,
- Major electric transmission facilities,
- Trucking,
- Rail,
- Ports.

- Know the electric utilities and gas distribution company service areas
- Locate all major petroleum import terminals for your state
- Know the routes of your state's major highways
- Understand the distribution of all major fuel retail outlets.

6. Be Familiar With Response Measures

The tools of response are most often called measures. Various measures are appropriate for different levels of response. Ideally, a state will have passive and voluntary measures to mitigate minor problems and an increasing scale of active and mandatory measures for more severe stages of supply disruption.

In summary:

- Understand what is possible and not possible in your state.
- Be prepared to explain how measures work and
- Why they might be recommended.
- Be prepared to recommend measures to the Governor
- Voluntary,
- Mandatory,
- Supply Enhancement,
- Demand restraint.

7. Continue To Work With The Private Sector

Remember, various segments of the fuel industry compete for customers. It is in their interest to provide seamless, reliable service. All segments of the fuel industry are covered by one or more rules pertaining to such factors as price, territory, supply obligations or safety. Given this, you can rely on the private sector as the “first line of defense” in mitigating a fuel shortage. Notwithstanding bad press, coordinate with the private sector to handle most mild and moderate supply problems and make the administration of mandatory measures, when necessary, efficient.

In summary:

- Understand the energy shortage mitigation plans of local distribution companies.
- Know the executive director of the local petroleum, propane and related professional associations.
- Maintain current contacts and communications.

8. Update Your Plan

The energy supply industry is dynamic. Mergers, technology, changes in consumption patterns and political events all impact a state's energy profile. Assume that some of your plan's information will be questionable within two to three years and significantly out-of-date in five to seven years. Budget money and staff for plan upgrades.

In summary:

- Review the State's Energy Emergency Preparedness Plan on a regular basis.
- Take account of changes in local and national energy markets as they impact your state.
- Coordinate your planning with your state's emergency agency.

9. **Maintain An Alternative Budget for Emergencies**

Plan to defend some politically acceptable maintenance budget for routine monitoring and plan updates and have a short-term, augmented, budget ready to present to higher authority when an emergency occurs.

In summary:

- Understand your budget for emergencies.
- Strive to maintain some amount of contingency planning funds to defray the costs of gearing up for any fuel shortage that affects your state.

10. **Be Prepared When Meeting With The Media**

Being the "expert" places a special burden on the state's energy emergency information contact. First of all, given the tendency to work closely with emergency management agencies, you can reduce distress and embarrassment by clarifying which agency is to be the official spokesman for the particular emergency. And, remember the first commandment -- no matter where an energy office is located, the Governor will become involved. Know the Governor's Press Office protocols before the first reporter calls.

It almost goes without saying, knowing the numbers will enable the spokesperson to say something intelligent without venturing into the dangerous, but media preferred, waters of speculation. Keep the report simple, number-driven, upbeat and short. Answer baited or antagonistic (or baited seemingly friendly) questions with the numbers. Try to think ahead of the questions.

In summary:

- Understand the Governor's Press Office communication protocol.
- Know your state government's communications hierarchy.
- Know when to speak and who is responsible for saying it.
- Stay abreast of events.
- Make sure the director is briefed daily, or more often, on the numbers as well as the situation.
- Practice responding to hostile questions.
- Know when to hol d ' em and know when to f ol d 'em.